

**Badenian (Middle Miocene) Conoidean (Neogastropoda) fauna
from Letkés (N Hungary)**

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Abstract – Taxonomic composition of a newly excavated Badenian Conoidean fauna (families Conidae and Conilithidae) from Letkés (Börzsöny Mts, Hungary) is given. Thirty nine species are described, including *Leptoconus hirmetzli* sp. n. designated here. Several taxa represent new records from the Miocene deposits of Hungary: *Chelyconus dertogibbus* (Sacco), *Lautoconus eschewegi* (da Costa), *L. belus* (d'Orbigny), *L. raristriatus* (Bellardi et Michelotti), *L. ventricosus* (Gmelin), *Lithoconus parvicaudatus* (Sacco), *L. planospira* (Erünaal-Erentöz), *L. cf. anguliferus* (Peyrot), *Monteiroconus aldrovandi* (Brocchi), *Plagioconus marii* (Sacco), *Varioconus mucronatolaevis* (Sacco), *V. taurinensis* (Bellardi et Michelotti). The overall similarity of this Central Paratethyan and of the Mediterranean Conoidean faunas indicates a close relationship between the two palaeobiogeographic domains during the Middle Miocene. With 160 figures.

Key words – Badenian, Börzsöny Mts, Conidae, Conilithidae, Hungary, Letkés, Middle Miocene, Neogastropoda

INTRODUCTION

The aim of this paper is to present the conoid fauna of a newly excavated Lower Badenian section at Letkés village. Letkés is a well-known Middle Miocene locality at the western part of the Börzsöny Mts (N Hungary). The new section was discovered by one of us (Z. Vicián) during a field trip. It is situated on the low slope of Bagoly Hill about 400 m eastward from the village (coordinates: N 47.888319°, E 18.784647°) (Fig. 1). The studied assemblage was collected during the last three years and the conoids are deposited in the palaeontological collection of the Hungarian Natural History Museum, Budapest. The comprehensive analysis of the immensely rich fossil fauna is in preparation.

The Miocene palaeogeography and the lithological formations of the Carpathian Basin were summarised by HÁMOR (2001). The sedimentary environment during the Miocene volcanism of the Börzsöny Mts was studied in detail by KARÁTSÓN *et al.* (2000) and the geological background of the neighbouring

fossil locality at Szob was briefly discussed by DULAI (1996, 2007). The Börzsöny Mts belonged to the Inner Carpathian Volcanic Chain and consists of mainly andesite of about 1000 m thickness. At the margins volcanic rocks are overlain by shallow marine sedimentary formations (“Leitha Limestone”, Badenian Clay, schlier, different sandy and marly deposits). The locality studied here is characterised by resedimented beds without well-visible layering. The allochthonous fauna consists of large, subangular fragments and transported, eroded colonial coral blocks in grey to brownish clayey sand matrix. The rock fragments are represented mainly by different groups of andesite and andesitic tuff but some quartz pebbles also occur. The hard limestone mentioned by CSEPREGHY-MEZNERICS (1956) from her adjacent locality is missing here.

The subsurface thickness of the section is about 170 cm. The uppermost bed (40–60 cm) is characterised by marly sand with some bentonite and contains some mollusc coquinas. Fragmentary mollusc shells are common, but well-preserved gastropods, mostly large strombid and conoid specimens were also found. The next,

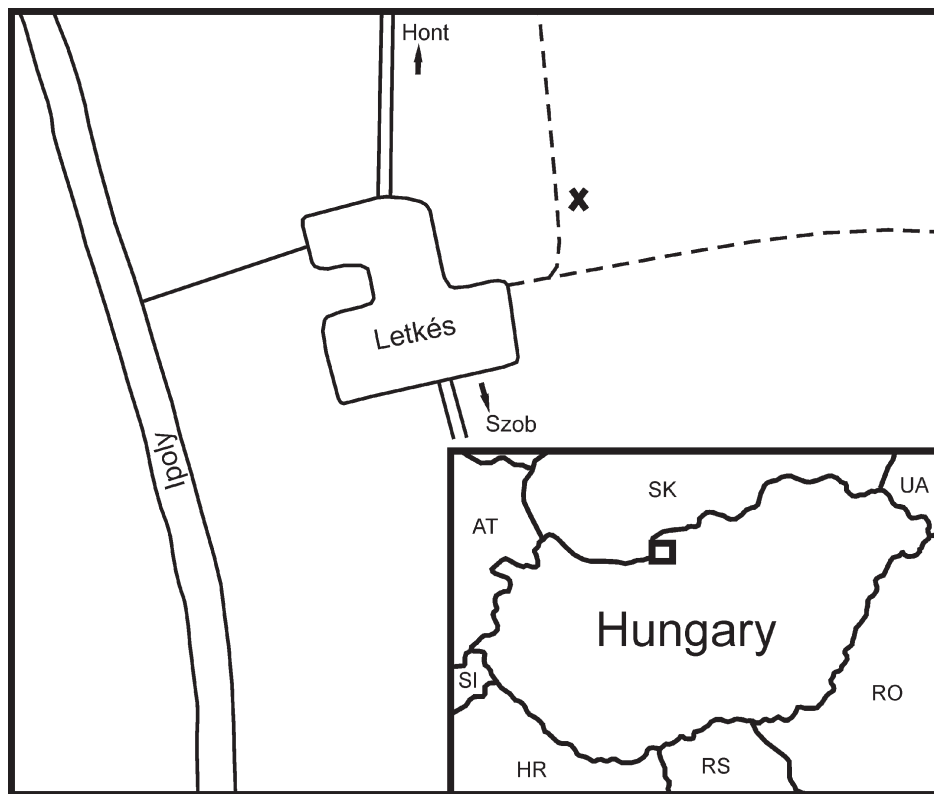


Fig. 1. The newly excavated Lower Badenian locality at Letkés, N Hungary.

limonitic sandy bed (20–60 cm) contains the richest macrofauna, well-preserved molluscs are frequent in “pockets” among rocks or coral blocks. The presumably resedimented third bed (20–30 cm) is a limonitic clayey-sandy facies with similarly rich mollusc fauna. The basis of the section is a 5 m thick greenish clay bed. Molluscs rarely occur in its uppermost 10–20 cm, but hereinafter the bed is unfossiliferous.

The macrofauna consists of colonial and solitary corals, serpulids, fragmentary echinoid and decapod remains, bivalves, gastropods, scaphopods, polyplacophores, small brachiopods, bryozoans and rarely fish teeth. The preservation of mollusc shells is variable. The fossils have not been preserved in their original environment, the shells of bivalves are always disconnected, and smooth gastropod shells are often scratched. On the other hand, beautifully preserved shells can also be found.

The age of the Miocene deposits of Letkés was assigned to the Tortonian by CSEPREGHY-MEZNERICS (1956). The misuse of this stage name that derived from an inaccurate correlation of the Central Paratethyan Middle Miocene Badenian Stage with the Late Miocene Tortonian of the Mediterranean region was widespread in the literature concerning the Central Paratethys in the first half of the 20th century. The “Tortonian” has been corrected for Badenian since the 1970s, and molluscs from Letkés were mentioned as belonging to the Lower Badenian by BÁLDI & KÓKAY (1970). The current investigation verifies this stratigraphical result. Based on the presence of the following zonal index Gastropoda species, the age of the assemblage can be assigned to the Lower Badenian: *Tudicla rusticula* (Basterot, 1825), *Rostellaria dentata* Grateloup, 1827, *Melongena cornuta* (Agassiz, 1843), *Merica obsoleta* (Hörnes, 1856), *Turritriton grundensis* (Hoernes et Auinger, 1884), *Jousseaumea diluviana* (Gray, 1824), *Prozonarina brocchii* (Deshayes, 1844), *P. tauroporcellus* (Sacco, 1894). Benthic foraminifers such as *Amphistegina mammilla* (Fichtel et Moll, 1798), *Planostegina costata* (d’Orbigny, 1846), *P. granulata* Papp et Küpper, 1954 indicate the Lower Lagenidae Zone.

TAXONOMY, DESCRIPTION AND TERMINOLOGY

The generic and subgeneric classification of *Conus* Linnaeus has widely been discussed in the literature. Taking into consideration the high diversity of this group, the necessity of a suitable genus level assignment has been obvious for almost all scholars. Nevertheless, none of the recently proposed taxonomic interpretations (e.g. DA MOTTA 1991, TUCKER & TENORIO 2009, BOUCHET *et al.* 2011) have met general acceptance; although the accomplishment offered by TUCKER & TENORIO (2009) is ubiquitously treated as “alternative representation”. This generic and suprageneric classification of recent conoids rests on a comprehensive integration of both shell and radular morphologies, cladistic analyses, and molecular studies. The

taxonomic achievement was completed with the fossil “*Conus*” material, implicitly, solely on the basis of shell morphological features. Although this methodological approach produces some uncertainty in the arrangement of fossil taxa, the genus level classification given by TUCKER & TENORIO (2009) seems to be acceptable to interpret the high diversity of the Letkés conoids. However, slight modifications of the taxonomy were achieved. Following the traditional nomenclature of the molluscan palaeontology, we regard both *Chelyconus* and *Dendroconus* as genera that have been ranging from the Miocene. Consequently, we have revised the generic assignment of some species. Furthermore, on the principle of priority, *Conus elongatus* Borson must be considered as type species of *Plagioconus* instead of *Conus elatus* Michelotti. Ten genera are recognised in the Letkés assemblage: *Chelyconus* Mörch, *Conilithes* Swainson, *Dendroconus* Swainson, *Kalloconus* da Motta, *Lautoconus* Monterosato, *Leptoconus* Swainson, *Lithoconus* Mörch, *Monteiroconus* da Motta, *Plagioconus* Tucker et Tenorio, *Varioconus* da Motta.

Terminology of description of shell characters, subsutural flexures and colour patterns is based on HENDRICKS (2008) and TUCKER & TENORIO (2009). The following morphological features were taken into consideration to identify species in this paper: shell size, proportion and overall shape, characteristics of the spire and spiral whorls, types of the shoulder, and sculptural features. If colour patterns could be traced, they were used to distinguish similar forms (Figs 2–7). The shape of the growth lines around the shoulder had a similar function. The role of the subsutural flexure (“anal notch”) in identification was first recognised by SMITH (1930), emphasised again by MUÑIZ (1999), and recently analysed by HENDRICKS (2008) and TUCKER & TENORIO (2009). For terminology and representation of subsutural flexure see HENDRICKS (2008: 10, text-fig. 2).

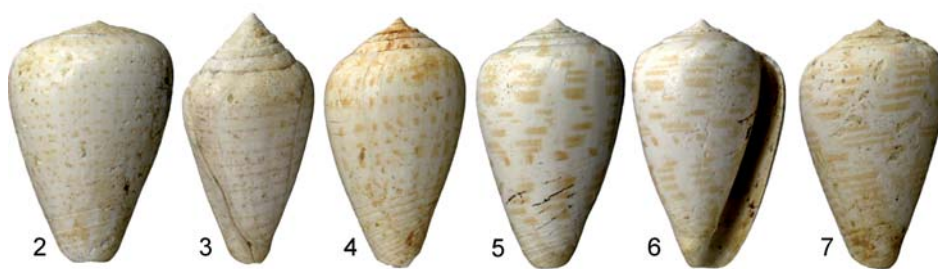
PREVIOUS WORKS ON “*CONUS*” FROM LETKÉS AND EVALUATION OF THE NEW MATERIAL

The Tertiary mollusc faunas of the western part of the Börzsöny Mts were discovered in the 1840s. First the vicinity of Szob, a small village at the Danube 10 km from Letkés, became known for its rich and well-preserved fossils. The first fauna list from the region was given by HÖRNES (1847) and five *Conus* species were later described in his monograph (HÖRNES 1856). Even from Szob, three *Conus* species were documented by KRENNER (1865). Fossil molluscs from Letkés were first recorded by STACHE (1866) with two *Conus* species. Similarly, also two taxa were mentioned by HALAVÁTS (1881) from here in his summary of the *Conus* fauna of the then Hungary. A bigger material was analysed by FRANZENAU (1886, 1897), who described nine *Conus* taxa within an assemblage of 83 gastropod species. There were no more data from Letkés in the first half of

the 20th century; NOSZKY (1925) summarised again the previous records. On the basis of newly collected material, a comprehensive revision of mollusc assemblages was published from Szob and Letkés by CSEPREGHY-MEZNERICS (1956). This monograph has been so far the most detailed elaboration of the Badenian molluscs of the region with documentation of 280 gastropod and 86 bivalve taxa. The conoids were represented by 18 taxa (69 specimens) from Szob and 10 taxa (31 specimens) from Letkés. As the above mentioned publications had been mostly based on classical works (e.g. HOERNES & AUINGER 1879, SACCO 1893, PEYROT 1930), some taxonomic revision was rendered by STRAUZ (1966).

New palaeontological materials have not been recorded from Letkés for more than fifty years. The assemblage presented here consists of 4,927 conoid specimens of which 3,786 were determinable representing 39 species. Six species form 55% of the identified material. The most frequent species are: *Monteiroconus bitorosus* (Fontannes) (491 specimens: 12.9%), *Conilithes canaliculatus* (Brocchi) (443: 11.7%), *Chelyconus miovoeslauensis* (Sacco) (362: 9.5%), *Dendroconus berghausi* (Michelotti) (344: 9%), *Varioconus olivaeformis* (Hoernes et Auinger) (244: 6.4%), *Varioconus ponderosus* (Brocchi) (211: 5.5%). Some species that are known from Hungary [e.g. *Plagioconus elongatus* (Borson) from Szob (STRAUSZ 1966, pl. 67, figs 11–12; BAŁUK 2006), *Chelyconus ottiliae* (Hoernes et Auinger) from the Mecsek Mts (BOHN-HAVAS 1973), *C. ventricosus* (Bronn) and *Lautoconus? subraristriatus* (da Costa) from different localities] are not yielded from the new excavation.

This diverse material with 39 species provides an opportunity to compare the Central Paratethyan fauna with those of the Mediterranean. The relationship between the two palaeobiogeographic domains is very close. The conoids from Letkés are closely allied to the material described in detail by HALL (1964), DAVOLI (1972) and ZUNINO & PAVIA (2009) from the upper Lower – Upper Miocene of Northern Italy, and they are also similar to some Pliocene materials known from Italy and Spain. This assemblage – in conjunction with revised



Figs 2–7. Colour patterns of some Conoidean species from Letkés. 2 = *Dendroconus berghausi* (Michelotti), 3 = *Varioconus enzesfeldensis* (Hoernes et Auinger), 4 = *Lautoconus belus* (d'Orbigny), 5–6 = *Monteiroconus bitorosus* (Fontannes), 7 = *Lautoconus eschewegi* (da Costa)

records from Western Romania (Lăpuşiu, Buituri) and from the Vienna Basin – shows clear Mediterranean character that was typical of the Central Paratethys from the Langhian (HARZHAUSER *et al.* 2003). Only five relatively rare species seem to be endemic Central Paratethyan forms: *M. tietzei*, *V. olivaeformis*, *C. miovoeslauensis*, *C. rotundus*, *C. steinabrunnensis*. The list of species described here is presented in alphabetical order on Figure 8. For comparison, some well-documented records are enclosed (with emendations of accepted synonyms):

1. Lăpuşiu, Transylvanian Basin (W Romania; Badenian) (CHIRA & VOIA 2001).
2. Vienna Basin (E Austria; Eggenburgian-Badenian) (SIEBER 1958*a, b*; HARZHAUSER 2003; MANDIC & STEININGER 2003).
3. Torino Hills (NW Italy; Burdigalian-Langhian) (HALL 1964; ZUNINO & PAVIA 2009).
4. Montegibbio (N Italy; Tortonian) (DAVOLI 1972).
5. Toscana and Umbria (N Italy; Pliocene) (MALATESTA 1974; SPADINI 1990; CHIRLI 1997).
6. Estepona (S Spain; Lower Pliocene) (MUÑIZ 1999).

SYSTEMATIC PALAEOLOGY

As most species of Conidae and Conilithidae described here have been discussed in detail in the literature, it seems sufficient to give only selected synonymy. Beside the types, mostly comprehensive revisions, rare and important Paratethyan records, and the latest papers are cited. Available data of distributions are collected. Beside the papers and books mentioned below, the following papers were used for summarising the Miocene “*Conus*” records from Hungary: BÁLDI (1960, 1973), BÁLDI & KÓKAY (1970), BÁLDI *et al.* (1964), CSEPREGHY-MEZNERICS (1950, 1954, 1958, 1966), FRANZENAU (1910), HÁMOR (1970), KÓKAY (1967, 1971), KÓKAY *et al.* (1984), NOSZKY (1925, 1940), SAINT MARTIN *et al.* (2000), STRAUZ (1924).

The following abbreviations are used in this paper: stages and substages in distribution: UE = Upper Eocene, UO = Upper Oligocene, M = Miocene, LM = Lower Miocene, MM = Middle Miocene, UM = Upper Miocene, P = Pliocene, LP = Lower Pliocene, UP = Upper Pliocene, H = Holocene. Measurements in mm: SL = shell length, MD = maximum diameter, SH = spire height, RSH = relative height of spire (SH/SL).

Superfamily Conoidea Fleming, 1822

Family Conidae Fleming, 1822

Subfamily Coninae Fleming, 1822

Genus *Chelyconus* Mörch, 1852

Stage	Miocene			Pliocene		Miocene				Pliocene	
	Lower	Middle	Upper	Lower	Upper	1	2	3	4	5	6
<i>aldrovandi</i> , <i>Monteiroconus</i>		---			---		•	•			
<i>anguliferus</i> , <i>Lithoconus</i>	-----	-----									
<i>antidiluvianus</i> , <i>Conilithes</i>	-----	-----				•	•	•	•	•	•
<i>antiquus</i> , <i>Lithoconus</i>	-----	-----			---	•	•	•	•		•
<i>belus</i> , <i>Lautoconus</i>	-----	-----			---			•			
<i>berghausi</i> , <i>Dendroconus</i>	-----	-----			---	•	•	•	•	•	
<i>betulinoides</i> , <i>Kalloconus</i>	-----	-----				•	•		•	•	
<i>bitorosus</i> , <i>Monteiroconus</i>	-----	-----					•	•	•	•	•
<i>brocchii</i> , <i>Conilithes</i>	-----	-----				•		•		•	•
<i>canaliculatus</i> , <i>Conilithes</i>	-----	-----				•	•	•		•	•
<i>clavatulus</i> , <i>Varioconus</i>	-----	-----			---			•	•		•
<i>conoponderosus</i> , <i>Varioconus</i>	-----	-----						•		•	•
<i>dertogibbus</i> , <i>Chelyconus</i>		-----							•		•
<i>dujardini</i> , <i>Conilithes</i>	←-----	-----				•	•	•	•	•	
<i>enzesfeldensis</i> , <i>Varioconus</i>		-----				•	•				
<i>eschewegi</i> , <i>Lautoconus</i>	-----	-----							•		•
<i>extensus</i> , <i>Plagioconus</i>		-----				•	•				
<i>fuscocingulatus</i> , <i>Dendroconus</i>	-----	-----			---	•	•				•
<i>granularis</i> , <i>Conilithes</i>	-----	-----					•	•	•		
<i>marii</i> , <i>Plagioconus</i>	-----	-----				•		•			
<i>mercati</i> , <i>Monteiroconus</i>	-----	-----				•	•	•	•	•	•
<i>miovoeslauensis</i> , <i>Chelyconus</i>		---						•			
<i>mucronatolaevis</i> , <i>Varioconus</i>	-----	-----			---	•	•				•
<i>olivaeformis</i> , <i>Varioconus</i>		---				•					
<i>parvicaudatus</i> , <i>Lithoconus</i>	-----	-----						•			
<i>pelagicus</i> , <i>Varioconus</i>	-----	-----				•	•	•		•	•
<i>planospira</i> , <i>Lithoconus</i>		---									
<i>ponderosus</i> , <i>Varioconus</i>	-----	-----				•	•	•	•	•	•
<i>puschi</i> , <i>Plagioconus</i>	-----	-----				•	•	•	•		
<i>pyrula</i> , <i>Lautoconus</i>	-----	-----			---		•			•	•
<i>raristriatus</i> , <i>Lautoconus</i>	-----	-----				•		•	•		
<i>rotundus</i> , <i>Chelyconus</i>		---					•				
<i>steinabrunnensis</i> , <i>Chelyconus</i>		---					•				
<i>steindachneri</i> , <i>Dendroconus</i>	-----	-----					•				
<i>taurinensis</i> , <i>Varioconus</i>	-----	-----						•	•	•	•
<i>tietzei</i> , <i>Monteiroconus</i>		---									
<i>ventricosus</i> , <i>Lautoconus</i>	-----	-----				•	•	•		•	•
<i>vindobonensis</i> , <i>Chelyconus</i>		---				•	•				

Fig. 8. Conoidean species from the Lower Badenian deposits of Letkés with known stratigraphic ranges. Records from six localities or areas are enclosed at the right side (1 = Lăpuşiu, Romania, 2 = Vienna Basin, Austria, 3 = Torino Hills, Italy, 4 = Montegibbio, Italy, 5 = Toscana and Umbria, Italy, 6 = Estepona, Spain)

Chelyconus dertogibbus (Sacco, 1893)

(Figs 9–10, 20–21)

- 1893 *Conus* (*Chelyconus*) *dertogibbus* – SACCO, p. 64, pl. 6, fig. 17, varieties: *semiovatospira*, *digitoides*, *suturata*, *perovuloidea*, *depressogibba*, *ovatoastensis*: p. 65, pl. 6, figs 19–24.
 1972 *Conus dertogibbus* Sacco – DAVOLI, p. 96, pl. 5, figs 1, 8–9, 14–16, 19–21, 24–26, 35–36, 40 (*cum syn.*).
 1999 *Conus* (*Chelyconus*) *dertogibbus* (Sacco) – MUÑIZ, p. 46, figs 2/F, 6/P–Q (*cum syn.*).
 2011 *Conus dertogibbus* (Sacco) – CAPROTTI, p. 67, fig. 7/T–U.

Material – 38 specimens.

Description – Shell moderately small (SL: 12–25). Spire high, outline straight to slightly convex. Teleoconch sutural ramps convex, last spiral whorl high. Shoulder subangulate, sloping. Body whorl ventricosely conical, outline sigmoid, smooth. Aperture narrow. Subsutural flexure asymmetrically curved.

Remarks – The species is characterised by moderate variability of development of the spire (SACCO 1893, DAVOLI 1972). The Letkés specimens are close to the syntype (figured by FERRERO MORTARA *et al.* 1984, pl. 18, fig. 5), and to the specimens represented in the literature.

Distribution – Italy (MM-P), France (MM), Spain (LP). Hungary: Letkés (MM).

Chelyconus miovoeslauensis (Sacco, 1893)

(Figs 11–15)

- 1856 *Conus ventricosus* Bronn – HÖRNES, pl. 3, fig. 6 *only*.
 1879 *Conus* (*Chelyconus*) *ventricosus* Bronn – HOERNES & AUINGER, pl. 6, figs 5–6.
 1893 *Conus* (*Chelyconus*) *miovoeslauensis* – SACCO, p. 108.
 1966 *Conus* (*Chelyconus*) *miovoeslauensis* Sacco – STRAUSZ, p. 457, text-fig. 204 (*cum syn.*).

Material – 362 specimens.

Description – Shell moderately small (SL: 16–28). Spire of moderate height, narrow, outline straight to slightly concave. Shoulder rounded. Body whorl ventricosely conical, outline convex, smooth with 4–5 widely spaced spiral grooves at the base. Subsutural flexure asymmetrically curved, of moderate depth.

Remarks – The Letkés material is close to the type in morphology. The validity of the species had been rejected by SIEBER (1958a), but it was confirmed again by STRAUSZ (1966). Two phenotypes appear in the studied assemblage. Most specimens bear smooth shell, while a few specimens are sculptured by spiral rows of granules (Figs 11–12). *Monteiroconus bitorosus* is a similar form; however, it is characterised by wider shell with subangulate shoulder and wider spire.

Distribution – Austria, Romania (MM). Hungary: Letkés (MM).

Chelyconus rotundus (Hoernes et Auinger, 1879)
(Figs 16–19)

- 1879 *Conus* (*Chelyconus*) *rotundus* nov. form. – HOERNES & AUINGER, p. 50, pl. 6, fig. 8.
1966 *Conus* (*Chelyconus*) *rotundus* Hoernes et Auinger – STRAUZ, p. 458, pl. 69, figs 9–10 (*cum syn.*).
1973 *Conus* (*Chelyconus*) *rotundus* Hoernes et Auinger – BOHN-HAVAS, p. 1122.
1997 *Conus* (*Chelyconus*) *rotundus* Hoernes et Auinger – BAŁUK, p. 64, pl. 22, figs 4–8 (*cum syn.*).

Material – 76 specimens.

Description – Shell medium-sized (SL: 24–54). Spire of low to moderate height, pointed, outline convex. Spiral whorls convex, smooth, suture deep. Shoulder subangulate. Body whorl conical, outline straight to slightly convex, smooth with fine grooves at the base. Aperture wide. Subsutural flexure asymmetrically curved.

Remarks – The Letkés specimens agree well with the type and the specimens figured by BAŁUK (1997). The species differs from *Varioconus conoponderosus* in lower and convex spire, and in subangulate shoulder, while from *Monteiroconus bitorosus* in shape of the body whorl and of the shoulder.

Distribution – Austria, (?)Italy, Poland, Romania (MM). Hungary: Letkés, Péccszabolcs, Szob (MM).

Chelyconus steinabrunnensis (Sacco, 1893)
(Figs 22–27)

- 1879 *Conus* (*Rhizoconus*) *ponderosus* Brocchi – HOERNES & AUINGER, pl. 5, figs 4, 6.
1893 *Conus* (*Chelyconus*) *steinabrunnensis* – SACCO, p. 75.
1956 *Conus* (*Rhizoconus*) *ponderosus steinabrunnensis* Sacco – CSEPREGHY-MEZNERICS, pl. 11, figs 11–12.
1969 *Conus* (*Chelyconus*) *ponderosus steinabrunnensis* (Sacco) – ATANACKOVIĆ, p. 214, pl. 13, fig. 3.
1997 *Conus* (*Rhizoconus*) *steinabrunnensis* (Sacco) – BAŁUK, p. 61, pl. 22, figs 1–3 (*cum syn.*).

Material – 124 specimens.

Description – Shell medium-sized (SL: 12–40). Spire low, outline concave. Whorls smooth, ramps flat. Shoulder angulate. Body whorl conical, outline convex, smooth with fine grooves at the base. Subsutural flexure asymmetrically curved.

Remarks – The Letkés material is close to the types, and to the specimens figured in the literature. The species differs from *Dendroconus fuscocingulatus* in angulate shoulder, and from *C. vindobonensis* in lower spire.

Distribution – Austria, Bosnia, Bulgaria, Poland, Romania (MM). Hungary: Devecser, Hidas, Letkés, Péccszabolcs, Szob, Budapest: Illés street, (?)Kerepesi street (MM).

Chelyconus vindobonensis (Partsch in Hörnes, 1856)
(Figs 28–29)

- partim 1856 *Conus ventricosus* Bronn – HÖRNES, p. 32, pl. 3, figs 5, 7 (non figs 6, 8).
 1879 *Conus (Chelyconus) vindobonensis* Partsch – HOERNES & AUINGER, p. 48.
 1966 *Conus (Chelyconus) vindobonensis* Partsch in Hörnes – STRAUZ, p. 458, pl. 69, figs 3–5.
 1973 *Conus (Chelyconus) ottiliae* Hoernes et Auinger – BOHN-HAVAS, p. 1123, pl. 7, figs 7–8.
 1973 *Conus (Chelyconus) vindobonensis* Partsch in Hörnes – NICORICI & SAGATOVICI, p. 176, pl. 27, figs 2–3.
 1997 *Conus (Chelyconus) vindobonensis* Partsch in Hörnes – BAŁUK, p. 65, pl. 23, figs 1–6 (*cum syn.*).
 ? 2001 *Conus (Chelyconus) vindobonensis* Partsch in Hörnes – CHIRA & VOIA, pl. 2, fig. 5.

Material – 51 specimens.

Description – Shell medium-sized (SL: 11–34). Spire of moderate height, outline concave. Protoconch multispiral, projected. Spiral whorls convex, smooth. Shoulder angulate. Body whorl conical, outline convex, smooth with incised grooves at the anterior end. Subsutural flexure asymmetrically curved.

Remarks – The Letkés specimens are close to the types, and agree with the materials presented by STRAUZ (1966) and BAŁUK (1997). *Dendroconus fusco-cingulatus* is a similar form, but it differs in lower spire and rounded shoulder. *C. steinabrunnensis* has longer body whorl, and bears lower spire with flat whorls.

Distribution – Austria, Czech Republic, Moldavia, Poland, Romania, Serbia, Turkey (MM), Algeria (UM). Hungary: Diósd, Hidas, Letkés, Budapest: Illés street (MM).

Genus *Leptoconus* Swainson, 1840

Leptoconus hirmetzli sp. n.
(Figs 30–37)

Holotype – Hungarian Natural History Museum, Department of Palaeontology and Geology; inventory number: PAL 2013.3.1. (Figs 34–36).

Paratypes – 1st paratype: Hungarian Natural History Museum, Department of Palaeontology and Geology; inventory number: PAL 2013.4.1; 2nd, 3rd and 4th paratypes: private collection of Tamás Hirmetzl (Hungary); 5th, 6th, 7th, 8th, and 9th paratypes: Hungarian Natural History Museum, Department of Palaeontology and Geology; inventory numbers: PAL 2013.5.1.–PAL 2013.9.1.

Type strata – Lower Badenian (Middle Miocene) clayey sand.

Type locality – Letkés, Börzsöny Mts, Hungary.

Derivation of name – In honour of Dr Tamás Hirmetzl, Hungarian fossil collector.

Diagnosis – Large shell with high and turruculate spire, paucispiral protoconch, conical and elongate body whorl, narrow aperture, and asymmetrically curved subsutural flexure.



Figs 9–10. *Chelyconus dertogibbus* (Sacco), INV 2013.186., SL: 22, MD: 11, apertural and abapertural views (1.5×). – **Figs 11–15.** *Chelyconus miovoeslauensis* (Sacco). 11–12 = INV 2013.181., SL: 21, MD: 12, apertural and abapertural views (1.5×), 13 = INV 2013.180., SL: 23, MD: 13 (1.5×), 14 = INV 2013.179., SL: 26, MD: 15 (1.2×), 15 = INV 2013.182., SL: 23.5, MD: 13 (1.5×). – **Figs 16–19.** *Chelyconus rotundus* (Hoernes et Auinger). 16 = INV 2013.201., SL: 26, MD: 15 (1.2×), 17–18 = INV 2013.202., SL: 27.5, MD: 17, apertural and abapertural views (1.2×), 19 = INV 2013.205., SL: 32, MD: 19 (1.2×). – **Figs 20–21.** *Chelyconus dertogibbus* (Sacco). 20 = INV 2013.221., SL: 19, MD: 9 (1×), 21 = INV 2013.191., SL: 22, MD: 13 (1×). – **Figs 22–27.** *Chelyconus steinabrunnensis* (Sacco). 22 = INV 2013.187., SL: 23, MD: 14 (1.5×), 23 = INV 2013.189., SL: 34, MD: 20 (1.2×), 24–25 = INV 2013.188., SL: 30, MD: 17, apertural and abapertural views (1.2×), 26–27 = INV 2013.190., SL: 31, MD: 19, apertural and abapertural views (1.2×). – **Figs 28–29.** *Chelyconus vindobonensis* (Partsch in Hörnes). 28 = INV 2013.206., SL: 33, MD: 19 (1×), 29 = INV 2013.193., SL: 24, MD: 14 (1.2×)

Measurements (mm)	shell length	maximum diameter	spire height
Holotype	62 (fragmentary)	21	28
1st paratype	132 (fragmentary)	42	43 (fragmentary)
2nd paratype	130 (fragmentary)	34	43 (fragmentary)
3rd paratype	67	17	28
4th paratype	33	9	12

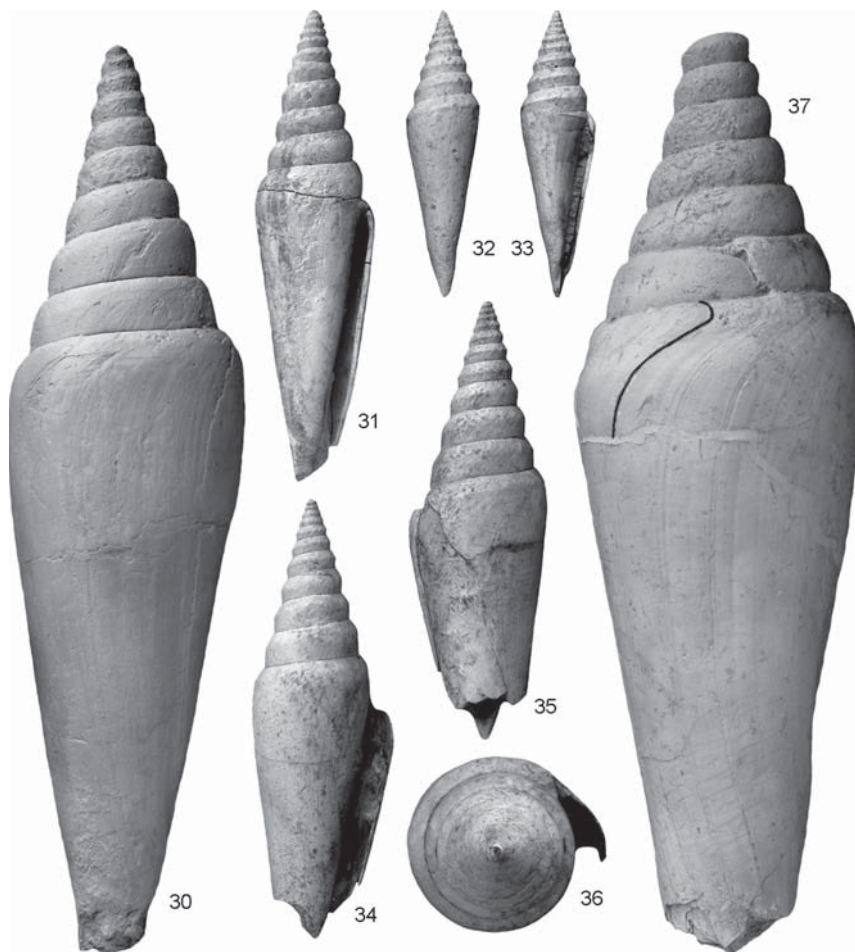
Description – The shell is large, elongate, and biconical. The spire is high, pointed, and turruculate, with 33–35° spire angle. The outline is straight on the juvenile specimens, while slightly concave on the adults. The protoconch consists of 2 whorls. The adult teleoconch consists of 12 high spiral whorls. The early 6 teleoconch whorls are angulate and weakly tuberculate in the middle; the late whorls are rounded and smooth. The shoulder of the body whorl is subangulate to rounded. The body whorl is smooth, elongate, conical, the outline is straight. Colour pattern cannot be traced. The aperture is narrow and straight. The subsutural flexure is asymmetrically curved and deep.

Remarks – The Letkés specimens described here differ from the Conoidean taxa recorded in the literature, therefore they are regarded as representatives of a new species. This species belongs to *Leptoconus* on the basis of the morphological resemblance between our specimens and two representatives of the genus: the extinct *L. aratispira* (Pilsbry, 1905), and the extant *L. milneedwardsi milneedwardsi* (Jousseume, 1894). Fossil records of *Leptoconus* are known from the Pliocene of Japan, Java, and Gulf of Aqaba.

Comparisons – *Plagioconus oblongoturbinatus* (Sacco, 1893) from the Italian Miocene is a similar form in size and morphology; it clearly differs, however, in much lower spire characterised by only 5–8 wholly angulate or flat spiral whorls. *Leptoconus melitoticulus* (Gregorio, 1895) from the Miocene of Malta resembles in overall morphology, but differs in lower and step-like spire. *Turriconus excelsus* (Sowerby, 1908) differs in much broader shell with angulate spiral whorls and shoulder. *Leptoconus aratispira* differs in lower and striate spire and in ornamented shell. The rare *L. milneedwardsi milneedwardsi* from the Indo-Pacific region seems to be the most closely allied form. It has a large shell (80–174 mm) characterised by a remarkably high spire, tuberculate early whorls and rounded to angulate shoulder, but it also differs in wholly angulate spiral whorls.

Phylogenetic connections – *Leptoconus hirmetzli* sp. n. is of uncertain origin; it probably derived from genus *Conilithes*. The overall morphology of two moderately small species, *C. canaliculatus* and *C. antidiluvianus* is quite similar. The former seems to be the closest form with its biconical shape; however, some large *C. antidiluvianus* specimens illustrated by SACCO (1893, pl. 4, figs 32–34) are also

similar in morphology, except the ornamentation. On the other hand, *L. hirmetzli* sp. n. has an obvious relation with the recent *L. milneedwardsi milneedwardsi*. Based on the striking resemblance between the two taxa, the new species might be regarded as both the ancestor of the latter, and the earliest representative of the genus. Although the seaway between the Mediterranean-Paratethyan and the Indo-Pacific regions ceased from the Serravallian, it had been open during the Langhian. The connection of the new fossil species and the extant taxa needs to be verified by future Neogene conoid records from East Africa or the adjacent regions.



Figs 30–37. *Leptoconus hirmetzli* sp. n. 30 = 2nd paratype, private collection of T. Hirmetzl, covered with ammonium-chloride (1×), 31 = 3rd paratype, private collection of T. Hirmetzl (1×), 32–33 = 4th paratype, private collection of T. Hirmetzl, abapertural and apertural views (1×), 34–36 = holotype, HNHM, PAL 2013.3.1., apertural, abapertural (1×) and apical (1.5×) views, 37 = 1st paratype, HNHM, PAL.2013.4.1. (1×)

Subfamily Puncticuliinae Tucker et Tenorio, 2009
Genus *Dendroconus* Swainson, 1840

Dendroconus berghausi (Michelotti, 1847)
(Figs 2, 38–40, 42)

- 1847 *Conus Berghausi* – MICHELOTTI, p. 342, pl. 13, fig. 9.
1964 *Conus berghausi* Michelotti – HALL, p. 134, pl. 23, figs 11, 18, 22–23, 28 (*cum syn.*).
1966 *Conus (Cleobula) berghausi vaceki* Hoernes et Auinger – STRAUZ, p. 464, pl. 71, figs 10–14.
1973 *Conus (Dendroconus) berghausi* Michelotti – BOHN-HAVAS, p. 1124, pl. 7, figs 3, 11, pl. 9, fig. 10.
1990 *Conus berghausi* Michelotti – DAVOLI, p. 100, pl. 9, figs 16–17, pl. 10, figs 10–11 (*cum syn.*).
1997 *Conus (Lithoconus) berghausi* Michelotti – BAŁUK, p. 58, pl. 21, figs 1–4 (*cum syn.*).
2009 *Conus (Lithoconus) berghausi* Michelotti – MIKUŽ, p. 36, pl. 12, fig. 164.

Material – 344 specimens.

Description – Shell moderately large (SL: 20–48). Spire low, outline concave to convex. Spiral whorls smooth or striate. Shoulder rounded. Body whorl broadly conical, outline convex, smooth with fine ridges at the base. Subsutural flexure asymmetrically curved. Colour pattern on some specimens consisting of spiral stripes of small blotches.

Remarks – The holotype, that was refigured by SACCO (1893, pl. 1, fig. 9), is missing; the neotype (SACCO l. c., pl. 1, fig. 16) was designated by HALL (1964). The species is generally characterised by a “fig-shape” shell with rounded shoulder and low, convex spire, but it varies in size, outline of the spire, development of growth lines, and shell-width. Because of the intraspecific variability, lots of species and subspecies were assigned in the 19th century: *C. broteri* by DA COSTA (1866); *C. daciae*, *C. vaceki*, *C. neumayri*, *C. voeslauensis*, *C. hungaricus* by HOERNES & AUINGER (1879); most of them were revised by the above-cited authors. Beside *D. berghausi*, both *D. moravicus* (Hoernes et Auinger) and *D. steindachneri* (Hoernes et Auinger) are recognised here as valid species.

Distribution – Corsica, France (M), Italy, Spain (M-LP), Austria, Turkey (LM-MM), Belgium, Bosnia, Bulgaria, Moldavia, Poland, Romania, Serbia, Slovakia, Slovenia, Ukraine (MM), Portugal (MM-UM), Morocco (UM), Libya (MM-?P). Hungary: Várpalota (LM), Bánd, Diósd, Hidas, Letkés, Márkháza, Mátraverebély, Péccszabolcs, Sámsonháza, Zebegény, Budapest: Rákos, Illés street (MM).

Dendroconus fuscocingulatus (Bronn in Hörnes, 1856)
(Figs 43–46)

- 1856 *Conus fusco-cingulatus* Bronn – HÖRNES, p. 21, pl. 1, fig. 5.
1958 *Conus (Dendroconus) loczyi* n. sp. – ERÜNAL-ERENTÖZ, p. 113, pl. 17, fig. 5, pl. 18, figs 3–4.
1960 *Conus (Dendroconus) fuscocingulatus* Bronn – KOJUMDGIEVA, p. 214, pl. 51, fig. 2.
1963 *Conus (Dendroconus) fuscocingulatus* Bronn – ATANACKOVIĆ, p. 78, pl. 15, fig. 5.

- 1966 *Conus (Chelyconus) fuscocingulatus* Bronn in Hörnes – STRAUZ, p. 459, pl. 68, figs 8–11.
1971–1972 *Conus fuscocingulatus* Bronn – CSEPREGHY-MEZNERICS, pl. 17, fig. 20.
1999 *Conus (Chelyconus)* cfr. *fuscocingulatus* Bronn in Hörnes – MUÑIZ, p. 48, figs 2/H, 7/E–H.
2003 *Conus (Chelyconus) fuscocingulatus* Bronn – ISLAMOĞLU & TANER, p. 61, pl. 5, figs 11–12.
2007 *Conus (Chelyconus) fuscocingulatus* Bronn – TIŢĂ, fig. 6/c.

Material – 116 specimens.

Description – Shell medium-sized (SL: 14–33). Spire of low to moderate height, outline concave. Spiral whorls smooth. Shoulder rounded. Body whorl ventricosely conical, outline convex, smooth with fine and dense spiral ridges at the anterior end. Subsutural flexure asymmetrically curved.

Remarks – The Letkés material is close to the type, but shows slight variety of the shell-width. The species resembles *C. steinabrunnensis* in morphology; however, it differs in narrower spire, and in remarkably rounded shoulder. It also differs from *C. miovoeslauensis* in concave spire and wider shoulder, and from *D. berghausi* in narrower body whorl.

Distribution – Austria, Bosnia, Bulgaria, Croatia, Czech Republic, Poland, Romania, Serbia, Slovakia, Turkey (MM), Greece (MM-UM), (?)Italy (UM), Spain (LP). Hungary: Borsodbóta, Diósd, Hidas, Kemence, Letkés, Márkháza, Mátraverebély, Nógrádszakál, Pécsszabolcs, Sámsonháza, Szob, Budapest: Adria street, Huszár street, Illés street, Rákos (MM).

Dendroconus steindachneri (Hoernes et Auinger, 1879)

(Figs 47–49)

- 1879 *Conus (Dendroconus) Steindachneri* nov. form. (= *Hochstetteri* in text) – HOERNES & AUINGER, p. 24, pl. 3, fig. 3.
1956 *Conus (Dendroconus) steindachneri* Hoernes et Auinger – CSEPREGHY-MEZNERICS, p. 422, pl. 11, figs 9–10, pl. 12, figs 1–2.
1963 *Conus (Dendroconus) steindachneri* Hoernes et Auinger – ATANACKOVIĆ, p. 79, pl. 14, figs 5–6.
1966 *Conus (Cleobula) steindachneri* Hoernes et Auinger – STRAUZ, p. 465, pl. 71, figs 6–9.
? 2009 *Conus (Dendroconus) steindachneri* Hoernes et Auinger – MIKUŽ, p. 35, pl. 12, fig. 162.
? 2011 *Conus (Cleobula) steindachneri* Hoernes et Auinger – HASANI & VAZARI, p. 128, fig. 7/G.

Material – 29 specimens.

Description – Shell medium-sized (SL: 20–34). Spire of moderate height, outline straight. Spiral whorls smooth. Shoulder broad, rounded. Body whorl ventricosely conical, outline convex, smooth with grooves at the base. Subsutural flexure slightly curved, oblique. Colour pattern on some specimens with spiral stripes of small blotches resembles that of *D. berghausi*.

Remarks – This rare species is closely allied to *D. berghausi*, but it differs in higher and straight spire. It is probably a morphotype of the latter, but we tem-

porarily recognise the validity at species level. *D. steindachneri* appeared in the Central Paratethys in the Karpatian. The morphology of the specimens figured by MIKUŽ (2009) and by HASANI & VAZARI (2011) seems to differ from that of the type.

Distribution – Austria, (?)Croatia, (?)Iran, Romania, (?)Slovenia, (?)Spain (LM-MM), Bosnia (MM). Hungary: Letkés, Magyaregregy, Szob (MM).

Genus *Kalloconus* da Motta, 1991

Kalloconus cf. *betulinoides* (Lamarck, 1810) (Figs 50–52)

1810 *Conus Betulinoides* – LAMARCK, p. 440.

Material – 28 specimens.

Description – Shell medium-sized (SL: 23–49). Spire low, outline convex. Spiral whorls smooth. Shoulder rounded. Body whorl ventricosely conical, outline slightly convex, smooth with fine ridges at the anterior end. Aperture wide. Subsutural flexure nearly symmetrically curved.

Remarks – The Letkés material contains only juvenile or fragmentary adult specimens. They resemble the neotype (designated by SACCO 1893, p. 4, pl. 1, fig. 1, refigured by DAVOLI 1972, pl. 2, fig. 1), and the specimens figured by DAVOLI (1972, pl. 2, figs 2, 6–7), by BAŁUK (1997, pl. 20, fig. 9) and by MIKUŽ (2009, pl. 12, fig. 163); nevertheless, the use of open nomenclature seems reasonable.

Distribution – Portugal (M), France, Turkey (M-P), Austria (LM-MM), Poland, Slovenia (MM), Greece (MM-UM), Italy, Spain (MM-P), Libya, (?) Malta (UM), Tunisia (UM-LP). Hungary: Letkés, Márkháza, Mátraverebély, Sámsonháza, Budapest: Rákos (MM).

Genus *Lautoconus* Monterosato, 1923

Lautoconus belus (d'Orbigny, 1852) (Figs 4, 53–55)

1847 *Conus pyrula* Brocchi – GRATELOUP, pl. 2, figs 12–13.

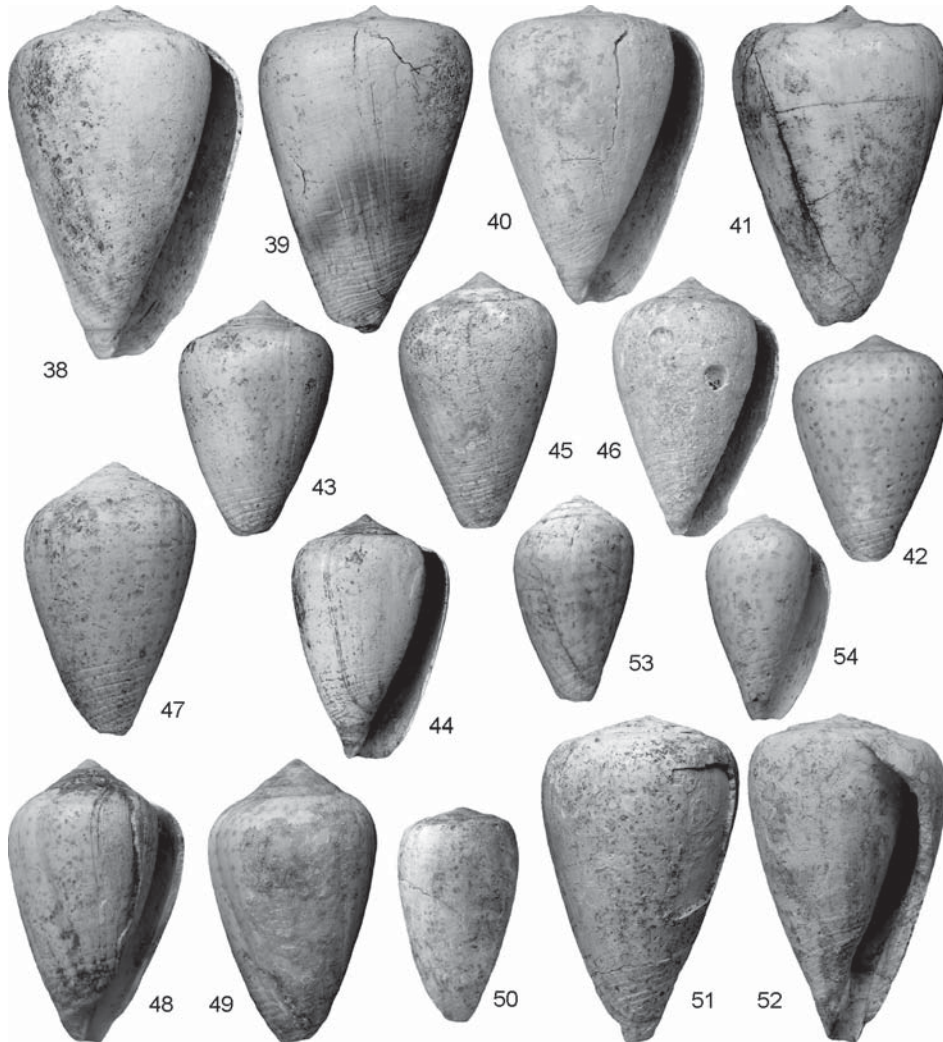
1852 *Conus Belus* – D'ORBIGNY, p. 11.

1893 *Chelyconus clavatus* var. *dendroconoides* – SACCO, p. 72, pl. 7, fig. 8.

1964 *Conus belus* Orbigny – HALL, p. 134, pl. 22, figs 4, 10, 15–16, 22 (*cum syn.*).

1999 *Conus (Dendroconus) belus* d'Orbigny – MUÑIZ, p. 71, figs 3/D, 9/A–B (*cum syn.*).

Material – 51 specimens.



Figs 38–40. *Dendroconus berghausi* (Michelotti). 38 = INV 2013.214., SL: 45, MD: 30 (1×), 39 = INV 2013.219., SL: 42, MD: 31 (1×), 40 = INV 2013.222., SL: 38, MD: 27 (1×). – **Fig. 41.** *Lithoconus planospira* (Erőnal-Erentőz). INV 2013.223., SL: 41, MD: 28 (1×). – **Fig. 42.** *Dendroconus berghausi* (Michelotti). INV 2013.218., SL: 19, MD: 14 (1.5×). – **Figs 43–46.** *Dendroconus fuscocingulatus* (Bronn in Hörnes). 43–44 = INV 2013.227., SL: 29.5, MD: 20, abapertural and apertural views (1×), 45–46 = INV 2013.226., SL: 33, MD: 20.5, abapertural and apertural views (1×). – **Figs 47–49.** *Dendroconus steindachneri* (Hoernes et Auinger). 47 = INV 2013.200., SL: 23, MD: 14.5 (1.5×), 48–49 = INV 2013.204., SL: 29, MD: 17, apertural and abapertural views (1.5×). – **Figs 50–52.** *Kalloconus* cf. *betulinoides* (Lamarck). 50 = INV 2013.235., SL: 23, MD: 13 (1.2×), 51–52 = INV 2013.236., SL: 42, MD: 26.5, abapertural and apertural views (1×). – **Figs 53–54.** *Lautoconus belus* (d’Orbigny). INV 2013.225., SL: 22, MD: 13, abapertural and apertural views (1.5×)

Description – Shell medium-sized (SL: 19–35). Spire low to moderately high, pointed, outline convex. Spiral whorls smooth. Shoulder rounded. Body whorl conical, outline convex, slightly sigmoid, smooth with fine grooves at the anterior end. Colour pattern consisting of irregularly wider or narrower spiral stripes of small blotches. Subsutural flexure almost straight, diagonal.

Remarks – The shells of the Letkés specimens are narrower than that of the hypotype (figured by HALL 1964, pl. 22, figs 4, 10), they are closer to the type of *C. clavatus dendroconoides* Sacco (refigured by HALL l. c., fig. 22). The species is closely allied to *L. eschewegi* in morphology; however, it is a narrower form with different colour pattern.

Distribution – Italy (LM-LP), Austria, Bulgaria (MM), France (UM-LP), Spain (LP). Hungary: Letkés (MM).

Lautoconus eschewegi (da Costa, 1866)
(Figs 7, 56–61)

1866 *Conus Eschewegi* – DA COSTA, p. 29, pl. 9, figs 18–23.

1955 *Conus eschewegi* da Costa – DA VEIGA FERREIRA, p. 33, pl. 9, fig. 67, pl. 10, fig. 72.

1971 *Conus aldrovandi* Brocchi – EREMIJA, p. 78, pl. 5, fig. 8.

1972 *Conus eschewegi* da Costa – DAVOLI, p. 107, pl. 6, figs 1–17 (*cum syn.*).

1999 *Conus (Dendroconus) eschewegi* da Costa – MUÑIZ, p. 73, figs 3/E, 9/C–E (*cum syn.*).

2003 *Conus eschewegi* da Costa – DAVOLI, p. 451, pl. 1, fig. 14.

Material – 152 specimens.

Description – Shell medium-sized (SL: 18–48). Spire narrow, low, outline convex. Spiral whorls smooth, convex. Shoulder rounded. Body whorl ventricosely conical, outline sigmoid, smooth with fine ridges at the anterior end. Colour pattern consists of spiral stripes of thin, widely spaced dashes or quadrangular patches. Well-developed, bent columellar fold. Anterior notch developed. Aperture wide. Subsutural flexure almost straight, oblique.

Remarks – The lectotype (DA COSTA 1866, pl. 9, fig. 23) was designated by SACCO (1893: 12), and refigured by GONÇALVES & MONTEIRO (2012). The species is very similar to *L. cacellensis* (da Costa) in overall shape, but the latter is fully ornamented by widely spaced spiral ridges on the body whorl (see GONÇALVES & MONTEIRO 2012). *Varioconus clavatulus* differs in much higher spire with less raised whorls, in less developed siphonal bend, and in asymmetrically curved subsutural flexure. Some specimens (Figs 59–61) are close to the high-spired examples illustrated by DAVOLI (1972, pl. 6, figs 4, 9). The overall morphology of the specimen represented by EREMIJA (1971) agrees well with that of the lectotype of *L. eschewegi*.

Distribution – Turkey (LM), Isles of Azores, Portugal (MM-UM), Morocco (UM), Italy (MM-P), Spain (MM-LP). Hungary: Letkés (MM).

Lautoconus pyrula (Brocchi, 1814)
(Figs 62–65)

1814 *Conus pyrula* – BROCCHI, p. 288, pl. 2, fig. 8.

1964 *Conus pyrula* Brocchi – HALL, p. 152 (*cum syn.*).

1974 *Conus (Chelyconus) pyrula* Brocchi – MALATESTA, p. 383, pl. 30, fig. 8 (*cum syn.*).

1997 *Conus (Chelyconus) pyrula* Brocchi – BAŁUK, p. 63, pl. 21, figs 5–6 (*cum syn.*).

1999 *Conus (Dendroconus) pyrula* Brocchi – MUÑIZ, p. 74, fig. 9/F–G (*cum syn.*).

Material – 22 specimens.

Description – Shell medium-sized (SL: 25–42). Spire of moderate height, outline sigmoid. Apex elevated, spiral whorls smooth. Shoulder rounded. Body whorl ventricosely conical, outline slightly sigmoid, smooth with fine incised grooves at the anterior end. Subsutural flexure slightly curved, almost diagonal, of moderate depth.

Remarks – The Letkés specimens agree well with the holotype (figured by PINNA & SPEZIA 1978, pl. 24, fig. 1), and with the specimens represented in the literature.

Distribution – Cyprus (M), France (LM), Austria, Bosnia, Czech Republic, Romania, Serbia (MM), Greece, Portugal (MM-UM), Italy, Spain, Turkey (MM-P). Hungary: Letkés, Mátraverebély, Budapest: Rákos (MM).

Lautoconus raristriatus (Bellardi et Michelotti, 1840)
(Figs 66–69)

1840 *Conus Raristriatus* – BELLARDI & MICHELOTTI, p. 61, pl. 5, figs 8–9.

non 1856 *Conus raristriatus* Bellardi et Michelotti – HÖRNES, p. 28, pl. 3, fig. 2 [= *V. enzesfeldensis* (Hoernes et Auinger)].

1972 *Conus raristriatus* Bellardi et Michelotti – DAVOLI, p. 129, pl. 8, figs 1–2 (*cum syn.*).

2001 *Conus raristriatus* Bellardi et Michelotti – CHIRA & VOIA, pl. 1, fig. 2.

Material – 16 specimens.

Description – Shell medium-sized (SL: 30–48). Spire high, outline straight to slightly concave. Subapical whorls weakly tuberculate, late whorls flat to slightly convex, smooth. Shoulder rounded. Body whorl conical, outline straight, wholly ornamented with widely spaced fine spiral ridges. Subsutural flexure asymmetrically curved.

Remarks – The Letkés specimens are close to the syntype (figured by FERRERO MORTARA *et al.* 1984, pl. 19, fig. 3), but they differ in somewhat higher spire. They resemble the material published by DAVOLI (1972, pl. 8, fig. 1).

Distribution – Italy (M), Romania (MM). Hungary: Letkés (MM).

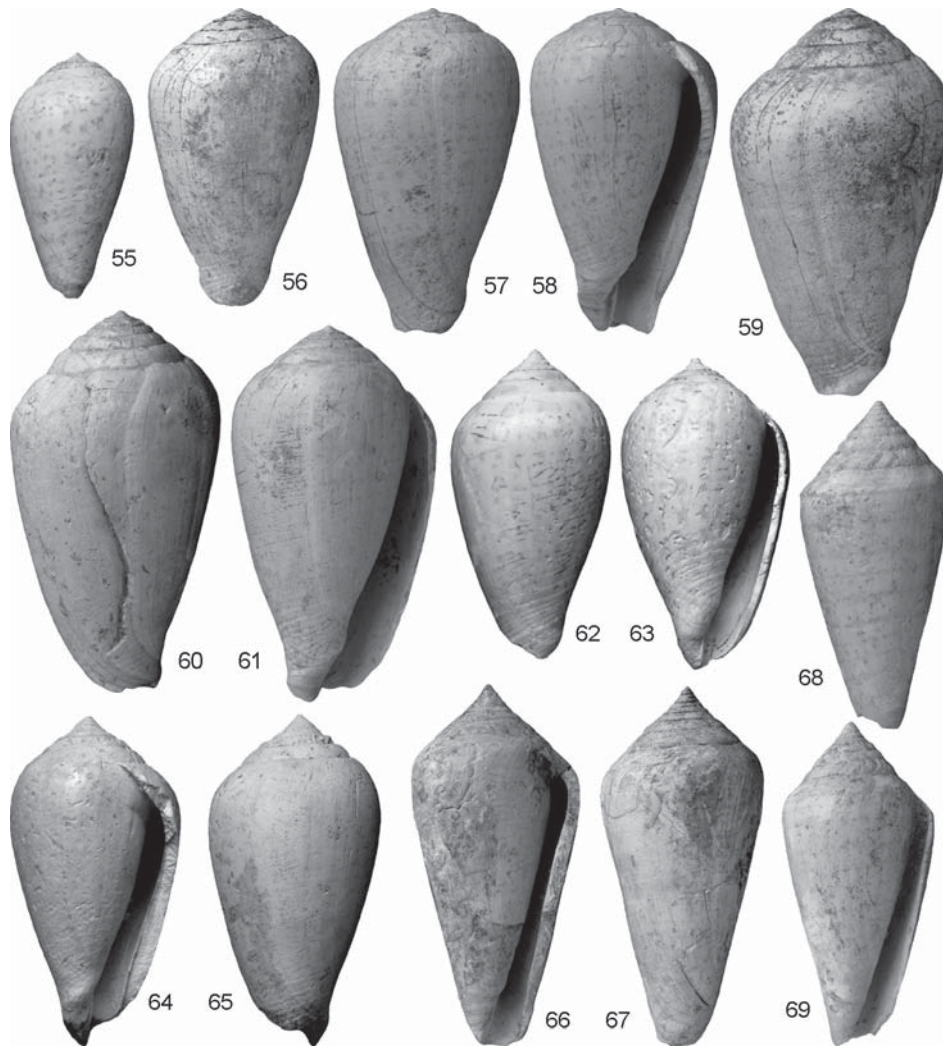


Fig. 55. *Lautoconus belus* (d'Orbigny). INV 2013.224., SL: 27, MD: 14 (1.2×). – **Figs 56–61.** *Lautoconus eschewegi* (da Costa). 56 = INV 2013.262., SL: 38, MD: 22 (1×), 57–58 = INV 2013.269., SL: 41, MD: 24, abapertural and apertural views (1×), 59 = INV 2013.248., SL: 49, MD: 28 (1×), 60–61 = INV 2013.250., SL: 48, MD: 26.5, abapertural and apertural views (1×). – **Figs 62–65.** *Lautoconus pyrula* (Brocchi). 62–63 = INV 2013.192., SL: 26, MD: 14, abapertural and apertural views (1.5×), 64–65 = INV 2013.196., SL: 37, MD: 20, apertural and abapertural views (1.2×). – **Figs 66–69.** *Lautoconus raristriatus* (Bellardi et Michelotti). 66–67 = INV 2013.264., SL: 45.5, MD: 21, apertural and abapertural views (1×), 68–69 = INV 2013.263., SL: 35, MD: 16, abapertural and apertural views (1.2×)

Lautoconus ventricosus (Gmelin, 1791)
(Figs 70–72)

1786 *Kegelschnecken* N. 46 – KÄMMERER, p. 91, pl. 6, figs 3–4.

1791 *Conus ventricosus* – GMELIN, p. 3397.

1792 *Conus mediterraneus* Hwass – BRUGUIÈRE, p. 701, pl. 330, fig. 4.

1999 *Conus (Chelyconus) ventricosus* – MUÑIZ, p. 65, figs 3/A, 8/K–L (*cum syn.*)

2012 *Conus (Lautoconus) mediterraneus* Hwass in Bruguière – LOZANO, p. 135, pl. 10, fig. 5.

Material – 82 specimens.

Description – Shell medium-sized (SL: 16–34). Spire of moderate height, outline straight. Spiral whorls smooth. Shoulder angulate. Body whorl ventricosely conical, outline slightly convex, smooth with fine ridges at the base. Aperture wide. Subsutural flexure almost diagonal.

Remarks – The species characterised by high level of intraspecific variability. 62 taxa were listed by TENORIO & RAYBAUDI-MASSILIA (2012) as synonyms. The Letkés material slightly differs from the type (KÄMMERER 1786), but it is similar to the specimens figured by DAVOLI (1972, pl. 8, fig. 16), MALATESTA (1974, pl. 30, fig. 11), CHIRLI (1997, pl. 4, figs 3–4, 6), and MUÑIZ (1999, fig. 8/K–L). *L. ventricosus* differs from *Varioconus ponderosus* in angulate shoulder.

Distribution – *L. ventricosus* is an extant species occurring in the Mediterranean Sea and in the Eastern Atlantic Ocean between Portugal and Senegal. Fossil records: Canary Islands, Italy, Portugal, (M-H), Germany, Syria (M), Belgium (LM-MM), Austria (MM), Malta (UM), Tunisia (UM-LP), Morocco, Spain (P), Cyprus, France (P-H). Hungary: Letkés (MM).

Lautoconus sp.
(Fig. 73)

Description – Shell fragmentary, large (SL: 51). Spire of moderate height, outline convex. Spiral whorls smooth, convex. Suture deep. Shoulder rounded. Body whorl ventricosely conical, outline convex, smooth with fine grooves at the anterior end. Subsutural flexure asymmetrically curved, of moderate depth.

Remarks – The robust shell of the specimen resembles that of the hypotype of *L. belus* illustrated by HALL (1964, pl. 22, figs 4, 10), and the *L. belus* specimen figured by SPADINI (1990, pl. 1, fig. 3); however, the large size is not typical of this species. *Chelyconus rotundus* is also a similar form, but it has lower spire. The poor state of preservation does not allow the specific identification.

Genus *Lithoconus* Mörch, 1852

Lithoconus antiquus (Lamarck, 1810)
(Figs 74–76)

- 1810 *Conus antiquus* – LAMARCK, p. 439.
 1956 *Conus (Lithoconus) subacuminatus* (d'Orbigny) – CSEPREGHY-MEZNERICS, p. 420, pl. 11, figs 5–6.
 1964 *Conus antiquus* Lamarck – HALL, p. 128, pl. 21, figs 1–12 (*cum syn.*).
 1973 *Conus (Lithoconus) subacuminatus* d'Orbigny – BOHN-HAVAS, p. 1069, pl. 7, fig. 10.
 1999 *Conus antiquus* Lamarck – MUÑIZ, p. 79, fig. 10/A–C (*cum syn.*).
 2004 *Conus antiquus* Lamarck – ISLAMOĞLU, p. 162, pl. 4, figs 5–6.
 2011 *Conus antiquus* Lamarck – CAPROTTI, p. 66, fig. 7/G–I.

Material – 69 specimens.

Description – Shell large (SL: 20–61). Spire low, outline concave to straight. Spiral whorls striate. Shoulder rounded to angulate. Body whorl elongate conical, outline concave, smooth with fine ridges on the lower third. Subsutural flexure asymmetrically curved. Colour pattern consisting of spiral stripes of square to rectangular patches.

Remarks – The Letkés specimens slightly differ from the lectotype (designated by KOHN 1982; figured on The *Conus* Biodiversity Website: biology.burke.washington.edu/conus). Some with higher spire of straight outline and somewhat sigmoid body whorl are close to *L. antiquus elatospirata* (SACCO 1893, pl. 3, fig. 13), others agree with the holotype of *L. subacuminatus* (figured by HALL 1964, pl. 21, figs 5, 8–9). The morphology of *L. antiquus* is very close to that of *Lithoconus leopardus* (Röding, 1798), the type species of the genus, therefore Lamarck's taxon is classified here as *Lithoconus*.

Distribution – Algeria, Angola, Corsica, France, Italy, Madeira Islands, Serbia, Switzerland, Turkey (M), Spain (M-LP), (?)Somalia (LM), Albania, Austria, Azores Islands, Bosnia, Czech Republic, Poland, Slovakia (MM), Greece, Portugal (MM-UM), Libya (UM). Hungary: Parád-fürdő (LM), Letkés, Ófalu, Péccszabolcs, Szob, Budapest: Illés street (MM).

Lithoconus parvicaudatus (Sacco, 1893)
(Figs 77–78)

- 1893 *Conus (Lithoconus?) parvicaudatus* – SACCO, p. 28, pl. 3, fig. 25; varieties: *turbinatissima*, *taurotessellata*: p. 29, pl. 3, figs 26–27.
 1964 *Conus parvicaudatus* Sacco – HALL, p. 155, pl. 26, figs 4, 7, 12–13 (*cum syn.*).

Material – 12 specimens.

Description – Shell medium-sized (SL: 30–48). Spire low, outline slightly concave. Spiral whorls striate, channelled. Shoulder angulate. Body whorl conical, outline gently concave, smooth with widely spaced ridges at the base. Subsutural flexure asymmetrically curved.

Remarks – The Letkés specimens correspond to the holotype (represented by FERRERO MORTARA *et al.* 1984, pl. 17, fig. 6) in overall morphology. The appearance of this rare Lower Miocene species in the Badenian is remarkable.

Distribution: Italy (LM). Hungary: Letkés (MM).

Lithoconus planospira (Erünaal-Erentöz, 1958)

(Fig. 41)

1856 *Conus Mercati* Brocchi – HÖRNES, pl. 2, fig. 2 *only*.

1897 *Conus Mercati* Brocchi – BRIVES, p. 19, pl. 5, fig. 9.

1958 *Conus (Lithoconus) planospira* n. sp. – ERÜNAL-ERENTÖZ, p. 111, pl. 17, fig. 4, pl. 18, fig. 1.

1960 *Conus (Lithoconus) mercati* var. *daciae* (Hoernes et Auinger) – KOJUMDGIJEVA, p. 211, pl. 50, fig. 1.

1966 *Conus (Lithoconus) mercati miocaenicus* Sacco – SYMEONIDIS, p. 292, pl. 15, fig. 4.

1968 *Conus (Lithoconus) planospira* Erünaal-Erentöz – HINCULOV, p. 152, pl. 38, fig. 10.

1972 *Conus betulinooides* Lamarck – DAVOLI, pl. 2, fig. 8.

Material – 20 specimens.

Description – Shell medium-sized to large (SL: 20–150). Spire flattened, apex pointed. Spiral whorls slightly concave, striate. Shoulder rounded. Body whorl broadly conical, outline convex, smooth with fine ridges at the base. Subsutural flexure asymmetrically curved.

Remarks – The Letkés specimens agree well with the types. The specimen figured by HÖRNES (1856, pl. 2, fig. 2) differs from *M. mercati* in morphology, it was interpreted as *L. planospira* by ERÜNAL-ERENTÖZ (1958). Without being cognizant of the latter arrangement, Hörnes's specimen was regarded as *D. berghausi* by HALL (1964), although the characteristic morphology of *D. berghausi* differs in higher, convex spire. Similarly, *D. berghausi* var. *planocylindrica* Sacco (1893, p. 10, pl. 1, fig. 15) seems to be close to *L. planospira*. The taxon differs from similar forms (*Monteiroconus mercati*, *M. tietzei* and *K. betulinooides*) in flattened spire; and from the latter in shorter, conical shell. The greater part of the *L. planospira* material of Letkés consists of medium-sized specimens with SL 35–45 mm; however, large forms also occur. One of these, a fragmentary giant specimen deserves attention: its SL is approximately 150 and MD is 80 mm.

Distribution – Algeria, Austria, Bulgaria, Greece, Italy, Portugal, Romania, Turkey (MM). Hungary: Letkés (MM).

Lithoconus cf. *anguliferus* (Peyrot, 1930)

(Fig. 79)

1930 *Conus (Lithoconus) Ixion* d'Orbigny monstr. *angulifera* – PEYROT, p. 93, pl. 2, fig. 21.

Description – Shell medium-sized (SL: 28). Spire low, outline concave. Subapical sutural ramps convex, biconcave, striate on the last two whorls. Shoulder carinate. Body whorl conical, outline sigmoid, fully ornamented with dense, fine, spiral ridges. Aperture narrow. Subsutural flexure biconcave.

Remarks – The Letkés specimen resembles the type in overall morphology, but it moderately differs in lower spire, in sharper shoulder, and in outline of the body whorl. Because of the poor preservation state of the shell we use open nomenclature.

Distribution – France (LM). Hungary: Letkés (MM).

Genus *Monteiroconus* da Motta, 1991

Monteiroconus aldrovandi (Brocchi, 1814) (Figs 80–81)

1814 *Conus Aldrovandi* – BROCCHI, p. 287, pl. 2, fig. 5.

1879 *Conus (Lithoconus) Aldrovandi* Brocchi – HOERNES & AUINGER, p. 25, pl. 4, fig. 2.

1964 *Conus aldrovandi* Brocchi – HALL, p. 125, pl. 20, figs 1, 5, 12, 14.

1969 *Conus (Dendroconus) aldrovandi* Brocchi – ATANACKOVIĆ, p. 213, pl. 13, fig. 1.

non 1971 *Conus aldrovandi* Brocchi – EREMIJA, p. 78, pl. 5, fig. 8 [= *L. eschewegi* (da Costa)].

Material – 5 specimens.

Description – Shell large (SL: 26–60). Spire moderately high, outline straight. Early spiral whorls step-like, the last two whorls convex. Shoulder rounded. Body whorl conical, outline convex, smooth with fine spiral ridges at the anterior end. Subsutural flexure asymmetrically curved, of moderate depth.

Remarks – The Letkés specimens agree with the holotype (figured by PINNA & SPEZIA 1978, pl. 17, fig. 2) in overall appearance, but differ in slightly higher spire. *Conus clavatus* Lamarck, 1810 was regarded as a synonym of *M. aldrovandi* by HALL (1964), however, this opinion has not been acknowledged in the literature (CHIRLI 1997).

Distribution – Corsica (M), Italy (MM-LP), Algeria, Austria, Bosnia, Czech Republic, Sardinia, Switzerland (MM), Spain (MM-UM). Hungary: Letkés (MM).

Monteiroconus bitorosus (Fontannes, 1879) (Figs 5–6, 82–86)

1879 *Conus bitorosus* – FONTANNES, p. 146, pl. 8, fig. 12.

? 1954 *Conus* sp. (*ventricosus* Bronn juv.) – STRAUZ, p. 113, pl. 7, fig. 145.

1964 *Conus bitorosus* Fontannes – HALL, p. 136, pl. 23, figs 1–2, 7–9, 13–17, 19–21, 24–25 (*cum syn.*).

1972 *Conus bitorosus* Fontannes – DAVOLI, p. 87, pl. 3, figs 7–10, pl. 8, figs 11, 15 (*cum syn.*).

1999 *Conus (Chelyconus) bitorosus* Fontannes – MUÑIZ, p. 38, figs 2/B, 6/E–H (*cum syn.*).



Figs 70–72. *Lautoconus ventricosus* (Gmelin). 70 = INV 2013.199., SL: 33, MD: 18 (1×), 71 = INV 2013.197., SL: 33, MD: 20 (1×), 72 = INV 2013.195., SL: 31, MD: 18 (1×). – **Fig. 73.** *Lautoconus* sp., INV 2013.291., SL: 51, MD: 33 (1×). – **Figs 74–76.** *Lithoconus antiquus* (Lamarck). 74–75 = INV 2013.247., SL: 58, MD: 34, abapertural and apertural views (1×), 76 = INV 2013.239., SL: 26, MD: 14 (1×). – **Figs 77–78.** *Lithoconus parvicaudatus* (Sacco). INV 2013.237., SL: 41, MD: 27, abapertural and apertural views (1×). – **Fig. 79.** *Lithoconus* cf. *anguliferus* (Peyrot). INV 2013.240., SL: 28, MD: 18, covered with ammonium-chloride (1×). – **Figs 80–81.** *Monteiroconus aldrovandi* (Brocchi). INV 2013.228., SL: 61, MD: 39, abapertural and apertural views (1×)

Material – 491 specimens.

Description – Shell medium-sized (SL: 18–51). Spire of low to moderate height, outline convex. Spiral whorls smooth. Shoulder subrounded. Body whorl ventricosely conical, outline convex, smooth with fine ridges at the base. Aperture wide. Subsutural flexure asymmetrically curved, of moderate depth. Colour pattern consisting of spiral stripes of dashes.

Remarks – *M. bitorosus* varies moderately in height of the spire. The species differs from *D. fuscocingulatus* in wider spire and in outline of the shoulder. The spire of *C. steinabrunnensis* and of *C. vindobonensis* is more concave; the shoulder of *C. steindachneri* is broader. The colour pattern of the species was represented by FORLI & CRESTI (2008, Fig. 1/5).

Distribution – Portugal (M), France (M-P), Italy (M-LP), Austria (LM-MM), Poland, Romania, Turkey (MM), Tunisia (UM-LP), Spain (LP). Hungary: (?) Várpalota (LM), Letkés (MM).

Monteiroconus mercati (Brocchi, 1814)
(Figs 87–91)

1814 *Conus Mercati* – BROCCHI, p. 287, pl. 2, fig. 6.

1966 *Conus (Lithoconus) mercati miocaenicus* SACCO – STRAUZ, p. 455, pl. 68, figs 3–5 (*cum syn.*).

1972 *Conus mercati* Brocchi – DAVOLI, p. 119, pl. 1, figs 2–3, 5–9 (*cum syn.*).

1973 *Conus (Lithoconus) mercati sharpeanus* (Costa) – BOHN-HAVAS, p. 1069, pl. 7, fig. 9.

1999 *Conus (Lithoconus) mercatii* Brocchi – MUÑIZ, p. 80, figs 3/J, 10/D–F (*cum syn.*).

2012 *Conus mercati* Brocchi – LOZANO, p. 132, pl. 10, fig. 1 (*cum syn.*).

Material – 66 specimens.

Description – Shell large (SL: 22–62). Spire of low to moderate height, outline straight to slightly concave. Spiral whorls smooth, sutural ramps flat to gently concave. Shoulder angulate. Body whorl conical, slightly elongate, outline convex, smooth with fine ridges at the base. Subsutural flexure asymmetrically curved, of moderate depth.

Remarks – The species shows moderate variety of development of the spire. Some Letkés specimens are close to the type of *M. mercati miocaenicus* (HÖRNES 1856, pl. 2, fig. 1), others resemble some Italian forms (SACCO 1893, pl. 2, figs 1, 3, 5, 7–8, 10, 13).

Distribution – Corsica, Madeira Islands, the Netherlands, Portugal, Switzerland, Turkey (M), Canary Islands, Egypt, Morocco, Spain (M-P), Germany (LM), France (LM-MM), Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Sardinia, Serbia, Slovenia (MM), Greece (MM-UM), Italy (MM-P), Algeria, Malta (UM), Balearic Islands, Syria (P). Hungary: Várpalota

(LM), Biatorbágy, Devecser, Diósd, Kemence, Letkés, Márkháza, Mátraverebély, Sámsonháza, Budapest: Adria street, Illés street, Rákos (MM).

Monteiroconus tietzei (Hoernes et Auinger, 1879)
(Figs 92–96)

1879 *Conus* (*Lithoconus*) *Tietzei* nov. form. – HOERNES & AUINGER, p. 28, pl. 1, fig. 3.

1956 *Conus* (*Lithoconus*) *tietzei* Hoernes et Auinger – CSEPREGHY-MEZNERICS, p. 420.

1969 *Conus* (*Lithoconus*) *tietzei* (Hoernes et Auinger) – ATANACKOVIĆ, p. 215, pl. 13, fig. 5.

Material – 114 specimens.

Description – Shell medium-sized (SL: 15–46). Spire of low to moderate height, outline concave. Spiral whorls striate. Sutural ramp of the body whorl flat, shoulder subangulate. Body whorl conical, outline straight to slightly convex, smooth with fine ridges at the base. Aperture wide. Subsutural flexure asymmetrically curved.

Remarks – The taxon was described from Szob and Lăpugiu by HOERNES & AUINGER (1879), and its validity was confirmed by CSEPREGHY-MEZNERICS (1956). The Letkés material agrees with the type, matches the specimen M 61.4800. in the collection of the Hungarian Natural History Museum, and resembles the specimen figured by ATANACKOVIĆ (1969). The species differs from *Dendroconus berghausi* in higher and concave spire, and in outline of the shoulder. *D. fuscocingulatus* is a narrower form with rounded shoulder. *M. mercati* differs in higher spire and in longer body whorl.

Distribution – Bosnia, Romania (MM). Hungary: Diósd, Kemence, Letkés, Szob (MM).

Genus *Plagioconus* Tucker et Tenorio, 2009

Plagioconus extensus (Partsch in Hörnes, 1856)
(Figs 97–100)

1856 *Conus extensus* Partsch – HÖRNES, p. 37, pl. 5, fig. 1.

non 1935 *Conus* (*Leptoconus*) *extensus* Partsch – VENZO, p. 204, pl. 17, fig. 6 [= *P. elongatus* (Borson)].

1956 *Conus* (*Leptoconus*) *extensus* Partsch – CSEPREGHY-MEZNERICS, p. 421, pl. 11, figs 7–8.

1960 *Conus* (*Leptoconus*) *extensus* Partsch – KOJUMDGIEVA, p. 210, pl. 49, fig. 6.

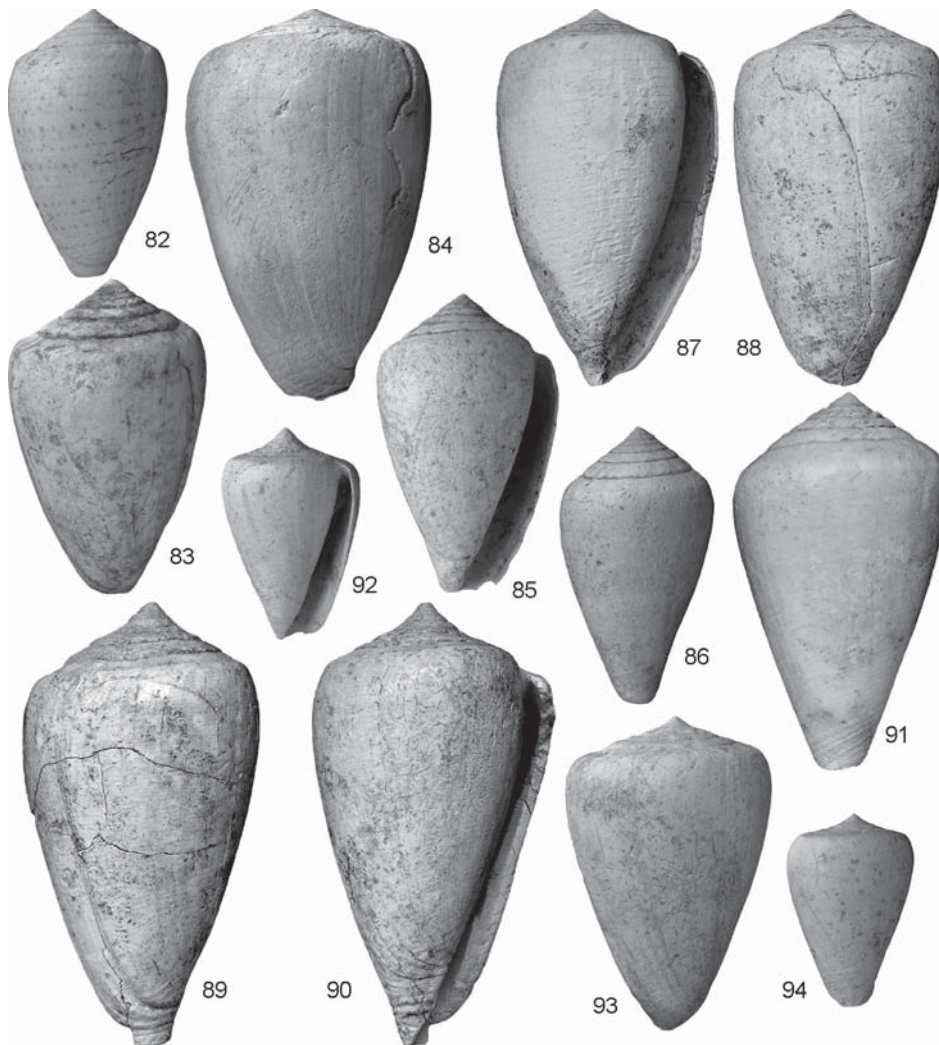
non 1966 *Conus* (*Leptoconus*) *extensus* Partsch – STRAUZ, pl. 67, figs 11–12 [= *P. elongatus* (Borson)].

1981 *Conus extensus* Partsch – WANK, pl. 1, fig. 2.

1998 *Conus* (*Phasmoconus*) *extensus* Partsch – SCHULTZ, pl. 29, fig. 13.

non 2001 *Conus* (*Leptoconus*) *extensus* Partsch – CHIRA & VOIA, pl. 2, fig. 1 (= *P. marii* Sacco)

Material – 62 specimens.



Figs 82–86. *Monteiroconus bitorosus* (Fontannes). 82 = INV 2013.289., SL: 28, MD: 17 (1.2×), 83 = INV 2013.288., SL: 40, MD: 25 (1×), 84 = INV 2013.287., SL: 52, MD: 34 (1×), 85 = INV 2013.284., SL: 32, MD: 19 (1.2×), 86 = INV 2013.290., SL: 30, MD: 16 (1.2×). – **Figs 87–91.** *Monteiroconus mercati* (Brocchi). 87–88 = INV 2013.213., SL: 48, MD: 28, apertural and abapertural views (1×), 89–90 = INV 2013.220., SL: 57, MD: 33, abapertural and apertural views (1×), 91 = INV 2013.211., SL: 48, MD: 28 (1×). – **Figs 92–94.** *Monteiroconus tietzei* (Hoernes et Auinger). 92 = INV 2013.267., SL: 25, MD: 17 (1×), 93 = INV 2013.274., SL: 40, MD: 29 (1×), 94 = INV 2013.270., SL: 25, MD: 17.5 (1×)

Description – Shell large (SL: 38–62). Spire high, outline straight, step-like. Early whorls finely tuberculate. Shoulder rounded. Body whorl narrowly conical, outline straight, smooth with marked, widely spaced grooves on the lower third to mid-height. Aperture narrow. Subsutural flexure asymmetrically curved and deep.

Remarks – The Letkés specimens match the type, but some bear slightly lower spire with somewhat rounded whorls. The closely allied *Plagioconus elongatus* (Borson) agrees well in size and general morphology (PAVIA 1976, BAŁUK 2006); however, it differs in growth of the spire, and in robust shape of the shoulder.

Distribution – (?)Turkey (M), Austria, Bulgaria, Romania (MM), (?)Spain (UM). Hungary: Hont, Letkés, Szob (MM).

Plagioconus marii (Sacco, 1893)

(Figs 101–105, 108)

1893 *Conus* (*Chelyconus*) *Marii* – SACCO, p. 62, pl. 6, fig. 1; varieties: *fusulopupoides*, *ovatopupoides*, *digitiformis*, *asparagispira*, *perfusulospira*, *clavatoidea*, *subconicospira*, *medioventrosa*, *subpileospira*, *ovatobrevis*, *pileospira*, *mamillatospira*: pp. 62–64, pl. 6, figs 2, 4–8, 10–15.

1964 *Conus marii* (Sacco) – HALL, p. 148, pl. 26, figs 8, 15–16, 21–22 (*cum syn.*).

2001 *Conus* (*Leptoconus*) *extensus* Partsch – CHIRA & VOIA, pl. 2, fig. 1.

? 2001 *Conus* (*Chelyconus*) *marii* Sacco – CHIRA & VOIA, pl. 4, fig. 2.

Material – 29 specimens.

Description – Shell large (SL: 40–78). Spire elevated, outline convex. Spiral whorls convex. Suture deep. Shoulder rounded. Body whorl elongate, ventricosely conical, smooth on the juvenile specimens, while pronounced ridges appear at the base on the adults. Aperture narrow, straight. Subsutural flexure asymmetrically curved.

Remarks – Some Letkés specimens agree well with the syntype (figured by FERRERO MORTARA *et al.* 1984, pl. 17, fig. 8). Others are closer to varieties represented by SACCO (1893): *C. marii* var. *digitiformis* (l. c., p. 62, pl. 6, fig. 5.); var. *medioventrosa* (l. c., pl. 6, fig. 11.). *Varioconus clavatulus* and *V. noe* (Brocchi) are similar forms, but both differ in much lower spire.

Distribution – Italy (LM), (?)Romania (MM). Hungary: Letkés (MM).

Plagioconus puschi (Michelotti, 1847)

(Figs 106–107)

1847 *Conus Puschi* – MICHELOTTI, p. 340, pl. 14, fig. 6.

1933 *Conus* (*Conospira*) *Puschi* Michelotti – DOUVILLÉ, p. 88, pl. 5, figs 1–3.

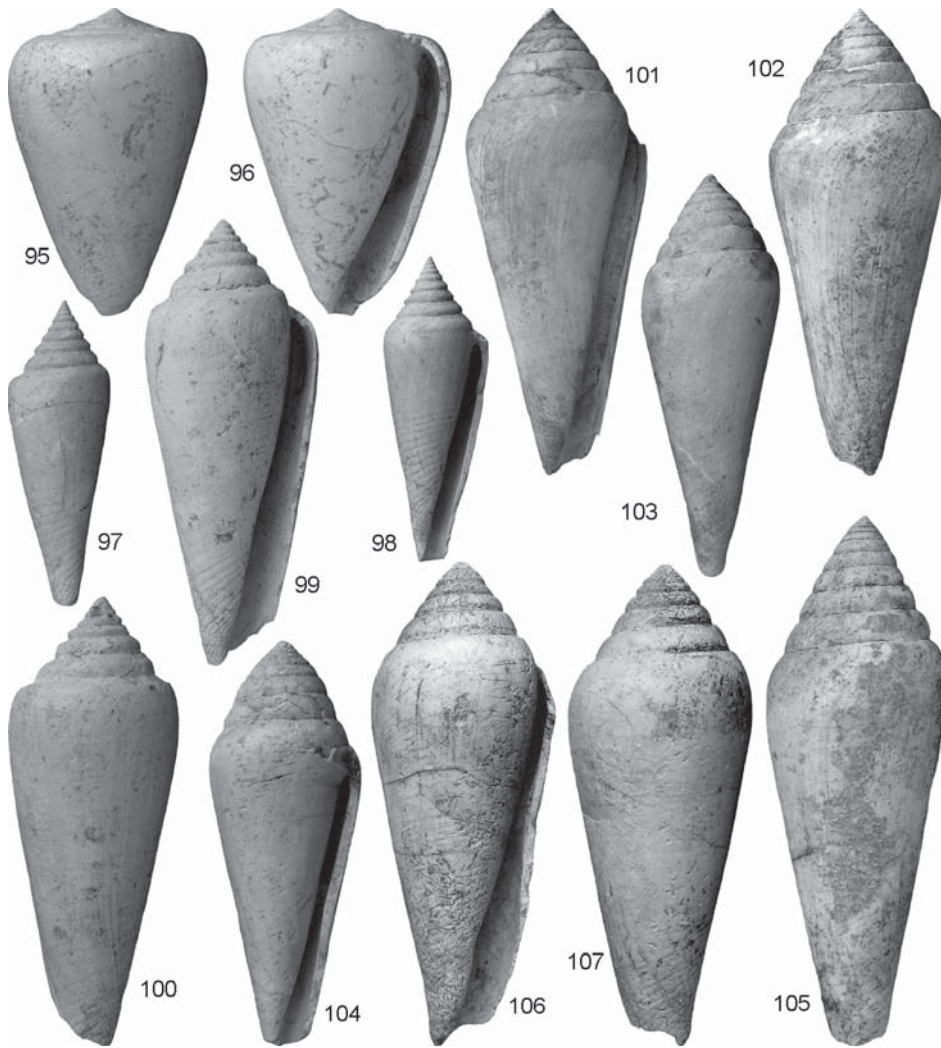
1956 *Conus* (*Chelyconus*) *puschi* Michelotti – CSEPREGHY-MEZNERICS, p. 419, pl. 10, figs 3–4.

1963 *Conus* (*Chelyconus*) *puschi* Michelotti – ATANACKOVIĆ, p. 78, pl. 15, fig. 2.

1966 *Conus* (*Chelyconus*) *puschi* Michelotti – SYMEONIDIS, p. 289, pl. 14, figs 1–3.

1972 *Conus puschi* Michelotti – DAVOLI, p. 128, pl. 8, figs 17–20 (*cum syn.*).

2004 *Conus puschi* Michelotti – ISLAMOĞLU, p. 164, pl. 4, fig. 9.



Figs 95–96. *Monteiroconus tietzei* (Hoernes et Auinger). INV 2013.273., SL: 40, MD: 27, abapertural and apertural views (1×). – **Figs 97–100.** *Plagioconus extensus* (Partsch in Hörnes), 97–98 = INV 2013.245., SL: 38, MD: 12.5, abapertural and apertural views (1×), 99–100 = INV 2013.242., SL: 57, MD: 22, apertural and abapertural views (1×). – **Figs 101–105.** *Plagioconus marii* (Sacco). 101–102 = INV 2013.258., SL: 60, MD: 23, apertural and abapertural views (1×), 103 = INV 2013.254., SL: 51, MD: 18 (1×), 104 = INV 2013.251., SL: 51, MD: 19 (1×), 105 = INV 2013.260., SL: 68, MD: 24 (1×). – **Figs 106–107.** *Plagioconus puschi* (Michelotti), INV 2013.230., SL: 62, MD: 24, apertural and abapertural views (1×)

Material – 18 specimens.

Description – Shell large (SL: 28–62). Spire conical, moderately high, outline straight. Spiral whorls convex. Shoulder rounded. Body whorl narrowly conical, outline straight, smooth with fine ridges on the lower third. Aperture wide. Subsutural flexure diagonal.

Remarks – The species differs from the closely allied forms with elongate body whorl (*P. elongatus*, *P. extensus*, *P. marii*) in growth of the spire, and in subsutural flexure.

Distribution – Angola, (?) Corsica, Egypt, Italy, Malta, Serbia, Switzerland (M), France, Turkey (LM-MM), Austria, Bosnia, Bulgaria, Romania (MM), Greece, Madeira and Azores Islands, Portugal (MM-UM), Algeria (UM), Morocco (P). Hungary: Devecser, Diósd, Letkés, Magyaregregy, Szob, Zebegény (MM).

Genus *Varioconus* da Motta, 1991

Varioconus clavatulus (d'Orbigny, 1852)

(Figs 109–110)

1847 *Conus clavatus* Lamarck var. B – GRATELOUP, pl. 2, fig. 4.

1852 *Conus clavatulus* – D'ORBIGNY, p. 11.

1972 *Conus* cf. *C. clavatulus* Orbigny – DAVOLI, p. 88, pl. 4, figs 5, 15–17 (*cum syn.*).

1996 *Conus* (*Chelyconus*) cf. *clavatulus* d'Orbigny – KÓKAY, pl. 4, fig. 3.

1999 *Conus* (*Chelyconus*) *clavatulus* d'Orbigny – MUÑIZ, p. 42, figs 2/D, 6/K–M (*cum syn.*).

2004 *Conus clavatulus* d'Orbigny – ISLAMOĞLU, p. 163, pl. 4, fig. 8.

Material – 15 specimens.

Description – Shell moderately small (SL: 30–34). Spire of moderate height, outline convex. Spiral whorls high, slightly convex, smooth. Suture deep. Shoulder rounded. Body whorl sigmoid, smooth with fine ridges at the base. Subsutural flexure asymmetrically curved, of moderate depth.

Remarks – The juvenile specimen figured here is close to that represented by DAVOLI (1972, pl. 4, fig. 16). The species resembles *V. noe* (Brocchi) in morphology, but it differs in lower spire.

Distribution – France (LM), Belgium, Germany, the Netherlands, Turkey (MM), Italy (M-LP), Spain (LP). Hungary: Letkés, (?)Budapest: Illés street (MM).

Varioconus conoponderosus (Sacco, 1893)

(Figs 111–115)

1893 *Conus* (*Chelyconus*) *conoponderosus* – SACCO, p. 75, pl. 7, fig. 22, varieties: *conicissima*, *subpupoidea*: p. 75–76, pl. 7, figs 23–24.

1966 *Conus* (*Chelyconus*) aff. *conoponderosus* Sacco – STRAUSZ, p. 462, pl. 70, figs 5, 6.

1972 *Conus conoponderosus* Sacco – DAVOLI, p. 90, pl. 4, figs 18–34, pl. 7, figs 3–5, 7–8 (*cum syn.*).

- 1996 *Conus (Chelyconus) conoponderosus* Sacco – KÓKAY, pl. 4, fig. 1.
 1999 *Conus (Chelyconus) conoponderosus* (Sacco) – MUÑIZ, p. 43, figs 2/E, 6/N–O (*cum syn.*).
 2004 *Conus conoponderosus* (Sacco) – ISLAMOĞLU, p. 162, pl. 4, fig. 7.

Material – 147 specimens.

Description – Shell medium-sized (SL: 19–43). Spire of low to moderate height, outline slightly convex. Spiral whorls smooth. Shoulder rounded to subangulate. Body whorl conical, outline straight to slightly convex, smooth with pronounced growth lines, and with fine grooves at the base. Subsutural flexure asymmetrically curved.

Remarks – The intraspecific varieties of the species were studied by DAVOLI (1972). Some of the Letkés specimens are close to the syntype (figured by FERRERO MORTARA *et al.* 1984, pl. 18, fig. 10), others differ in subangulate shoulder. *V. ponderosus* is a closely allied form, however, it differs in higher spire.

Distribution – Italy (M-P), (?)Austria, Turkey (MM), Spain (LP). Hungary: Letkés, Szob, Budapest: Illés street (MM).

Varioconus enzesfeldensis (Hoernes et Auinger, 1879)
 (Figs 3, 116–120)

- 1856 *Conus raristriatus* Bellardi et Michelotti – HÖRNES, p. 28, pl. 3, fig. 2.
 1879 *Conus (Chelyconus) Enzesfeldensis* nov. form. – HOERNES & AUINGER, p. 46.
 1956 *Conus (Chelyconus) enzesfeldensis* Hoernes et Auinger – CSEPREGHY-MEZNERICS, p. 420, pl. 3, fig. 9.
 1958 *Conus (Chelyconus) enzesfeldensis* Hoernes et Auinger – ERÚNAL-ÉRENTÖZ, p. 116, pl. 19, fig. 3.
 1966 *Conus (Chelyconus) enzesfeldensis* Hoernes et Auinger – STRAUSZ, p. 460, pl. 70, figs 7–9.
 1969 *Conus (Chelyconus) raristriatus* Bellardi et Michelotti – ATANACKOVIĆ, p. 215, pl. 13, fig. 2.
 1998 *Conus (Chelyconus) enzesfeldensis* Hoernes et Auinger – SCHULTZ, pl. 29, fig. 8.
 non 2001 *Conus (Chelyconus) enzesfeldensis* Hoernes et Auinger – CHIRA & VOIA, pl. 3, fig. 3 [= *V. ponderosus* (Brocchi)]

Material – 43 specimens.

Description – Shell medium-sized (SL: 25–41). Spire high, outline straight. Spiral whorls convex, smooth, sutures pronounced. Shoulder rounded. Body whorl conical, outline straight to slightly convex, ornamented with widely spaced spiral ridges and dotted brownish spiral lines. Subsutural flexure asymmetrically curved.

Remarks – The Letkés specimens agree with the type in morphology and ornamentation. The species is close to *V. pelagicus* in shape, but it differs in ornamentation. The colour pattern resembles that of *Lautoconus raristriatus* (Bellardi et Michelotti), but the spire is much higher. *V. enzesfeldensis* differs from *Monteiroconus aldrovandi* in narrower shell, higher spire, and ornamentation.

Distribution – (?)Spain (M), Turkey (LM-MM), Austria, Bosnia, Romania (MM), Greece (MM-UM). Hungary: Borsodbóta, Letkés, Pécszabolcs, Szob (MM).

Varioconus mucronatolaevis (Sacco, 1893)
(Figs 121–124)

1893 *Conus* (*Chelyconus*) *mucronatolaevis* – SACCO, p. 66, pl. 6, fig. 26, varieties: *fusoelegans*, *longovuloides*, *laevispira*, *taurobiconica*, *glandispira*, *globospira*, *permamillata*, *conicangulata*: p. 66–67, pl. 6, figs 27–34.

1964 *Conus mucronatolaevis* Sacco – HALL, p. 149, pl. 26, figs 9–11, 14, 20 (*cum syn.*).

1984 *Chelyconus mucronatolaevis* Sacco – FERRERO MORTARA *et al.*, p. 116, pl. 18, fig. 8.

1999 *Conus* (*Chelyconus*) *mucronatolaevis* (Sacco) – MUÑIZ, p. 53, figs 2/L, 7/M–N (*cum syn.*).

Material – 34 specimens.

Description – Shell medium-sized (SL: 25–43). Spire of moderate height, outline convex, apex projected. Spiral whorls smooth or finely striate. Shoulder rounded. Body whorl ventricosely conical, outline straight, smooth with fine ridges at the base. Subsutural flexure asymmetrically curved.

Remarks – Like SACCO's material (1893, pl. 6, figs 27–34), the Letkés specimens also show moderate variety of development of the spire. The taxon is allied to *Plagioconus marii*, but it differs in lower and wider spire.

Distribution – Italy (LM-MM), Bulgaria, (?)Romania (MM), Tunisia (UM-LP), Spain (LP). Hungary: Letkés (MM).

Varioconus olivaeformis (Hoernes et Auinger, 1879)
(Figs 125–130)

1879 *Conus* (*Chelyconus*) *olivaeformis* nov. form. – HOERNES & AUINGER, p. 52, pl. 1, fig. 23.

1973 *Conus* (*Chelyconus*) *olivaeformis* Hoernes et Auinger – BOHN-HAVAS, p. 1122, pl. 7, figs 5–6.

Material – 244 specimens.

Description – Shell moderately small (SL: 11–25). Spire moderate to high, outline straight to slightly convex. Teleoconch sutural ramps slightly convex, smooth. Shoulder rounded. Body whorl slightly elongate, narrowly ovate, outline convex, smooth with 4 spiral grooves at the base. Aperture wider at the base than at the shoulder. Anterior notch slightly developed. Subsutural flexure asymmetrically curved.

Remarks – Some of the Letkés specimens correspond to the type, others with slightly lower spire are close to that figured by BOHN-HAVAS (1973). *V. olivaeformis* was considered as one of the synonyms of *V. ponderosus* by HALL (1964); however, the species differs in smaller size, and in narrower shell.

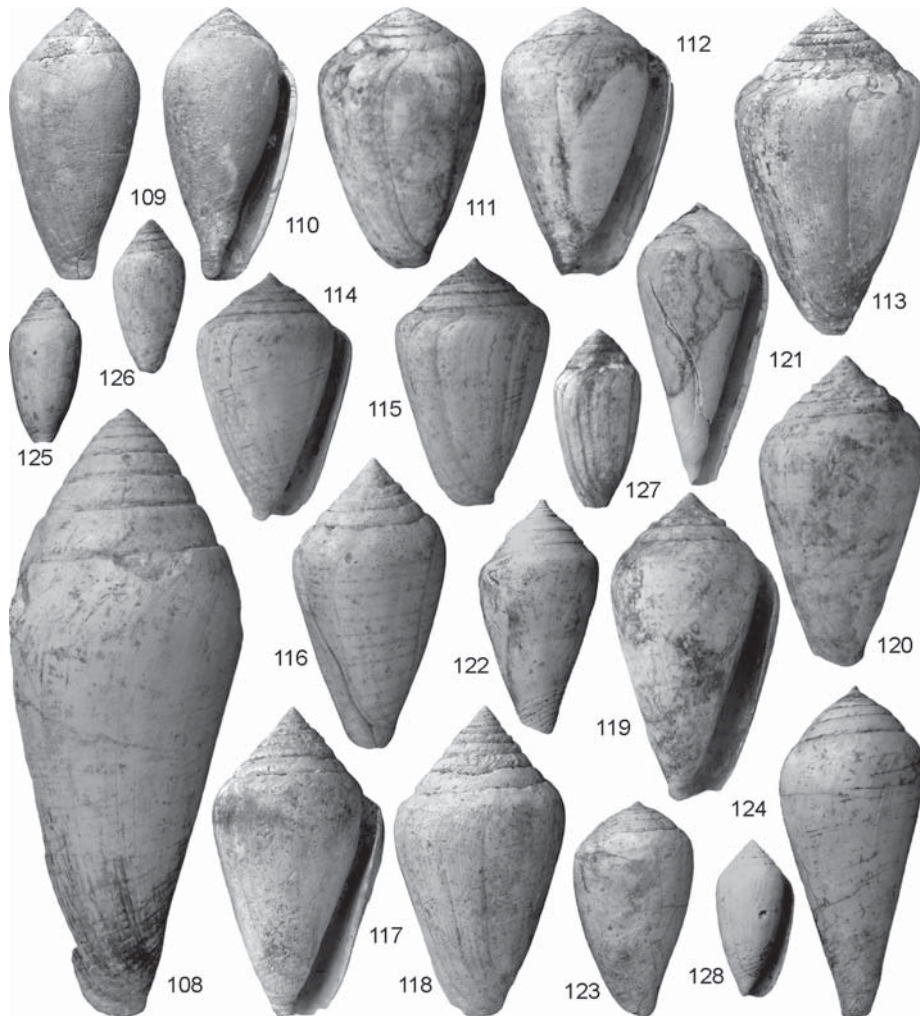


Fig. 108. *Plagioconus marii* (Sacco). INV 2013.261., SL: 80, MD: 33 (1×). – **Figs 109–110.** *Varioconus clavatulus* (d'Orbigny). INV 2013.210., SL: 30, MD: 14, abapertural and apertural views (1.5×). – **Figs 111–115.** *Varioconus conoponderosus* (Sacco). 111–112 = INV 2013.277., SL: 34, MD: 21, abapertural and apertural views (1×), 113 = INV 2013.276., SL: 43, MD: 24 (1×), 114–115 = INV 2013.243., SL: 33, MD: 20, apertural and abapertural views (1×). – **Figs 116–120.** *Varioconus enzesfeldensis* (Hoernes et Auinger). 116 = INV 2013.184., SL: 38, MD: 20 (1×), 117–118 = INV 2013.183., SL: 41, MD: 23, apertural and abapertural views (1×), 119–120 = INV 2013.246., SL: 40, MD: 22, apertural and abapertural views (1×). – **Figs 121–124.** *Varioconus mucronatolaevis* (Sacco). 121 = INV 2013.255., SL: 37, MD: 16 (1×), 122 = INV 2013.256., SL: 30, MD: 15 (1×), 123 = INV 2013.253., SL: 24, MD: 12 (1.2×), 124 = INV 2013.252., SL: 43, MD: 19 (1×). – **Figs 125–128.** *Varioconus olivaeformis* (Hoernes et Auinger). 125 = INV 2013.232., SL: 21, MD: 10 (1×), 126 = INV 2013.234., SL: 20.5, MD: 10 (1×), 127 = INV 2013.233., SL: 24, MD: 12 (1×), 128 = INV 2013.231., SL: 21.5, MD: 10.5 (1×)

Distribution – (?)Czech Republic, Romania (MM), (?)Italy (UM). Hungary: Letkés, Pécsszabolcs (MM).

Varioconus pelagicus (Brocchi, 1814)
(Figs 131–137)

- 1814 *Conus pelagicus* – BROCCHI, p. 289, pl. 2, fig. 9.
1879 *Conus (Chelyconus) Suessi* nov. form. – HOERNES & AUINGER, p. 43, pl. 1, figs 1, 15, pl. 6, figs 1–2 [non pl. 6, figs 3–4 = *Chelyconus posticestriatus* (Kojumdieva 1960)].
1956 *Conus (Chelyconus) puschi* Michelotti – PAVLOVSKY, pl. 2, fig. 5.
1964 *Conus pelagicus* Brocchi – HALL, p. 155, pl. 27, figs 1–4, 7, 15–16, 20–23 (*cum syn.*).
1999 *Conus (Chelyconus) pelagicus* Brocchi – MUÑIZ, p. 55, figs 2/N, 7/Q–R (*cum syn.*).
2012 *Conus pelagicus* Brocchi – LOZANO, p. 133, pl. 10, fig. 2.

Material – 72 specimens.

Description – Shell medium-sized (SL: 18–48). Spire conical, elevated, outline slightly convex to straight. Spiral whorls smooth or striate. Early whorls finely beaded. Shoulder rounded. Body whorl conical, outline sigmoid, ornamented with fine spiral ridges on the lower half. Small tubercles appear irregularly on the ridges of two specimens. Subsutural flexure nearly diagonal.

Remarks – The Letkés specimens are close to the holotype (figured by PINNA & SPEZIA 1978, pl. 18, fig. 4), but show slight variety of length and width of the body whorl. Some are allied to the type of *V. lapugyensis* (HOERNES & AUINGER 1879, pl. 1, fig. 9). Based on morphological features and stratigraphic range, *Conus suessi* Hoernes et Auinger is considered here as a junior synonym of *V. pelagicus*. The *Conus puschi* figured by PAVLOVSKY (1956, pl. 2, fig. 5) from Croatia is much closer to *V. pelagicus*.

Distribution – Algeria, Azores Islands, (?)Corsica, Sardinia (M), Canary Islands, Italy, Spain (M-P), France (LM), Albania, Austria, Bulgaria, Croatia, Romania, Ukraine (MM), Greece (MM-P). Hungary: Borsodbóta, Diósd, Letkés, Szob, Budapest: Illés street, Örs vezér square (MM).

Varioconus ponderosus (Brocchi, 1814)
(Figs 138–142)

- 1814 *Conus ponderosus* – BROCCHI, p. 293, pl. 3, fig. 1.
1952 *Conus (Chelyconus) pseudoponderosus* Dollfus et Dautzenberg mss., nov. sp. – GLIBERT, p. 376, pl. 13, fig. 4.
1964 *Conus ponderosus* Brocchi – HALL, p. 156, pl. 28, figs 1–21 (*cum syn.*).
1966 *Conus (Chelyconus)* cfr. *ponderosus* Brocchi – STRAUSZ, p. 463, pl. 69, fig. 11, pl. 70, fig. 1.
1973 *Conus (Chelyconus) pseudoponderosus* Glibert – BOHN-HAVAS, p. 1067, pl. 7, fig. 4, pl. 9, fig. 12.
1999 *Conus (Chelyconus)* cfr. *ponderosus* Brocchi – MUÑIZ, p. 59, figs 2/P, 8/A–B (*cum syn.*).
2001 *Conus (Chelyconus) ponderosus* Brocchi – CHIRA & VOIA, pl. 3, fig. 1.
2010 *Conus ponderosus* Brocchi – SOSSO & DELL'ANGELO, pp. 49, 65.

Material – 211 specimens.

Description – Shell medium-sized (SL: 20–46). Spire of moderate height, outline straight. Whorls flat to convex, smooth. Shoulder subangulate to rounded. Body whorl conical, outline straight to convex, smooth with fine ridges at the anterior end. Aperture wide, somewhat flaring. Subsutural flexure asymmetrically curved.

Remarks – The species shows remarkably high level of intraspecific variability (HALL 1964, pl. 28, figs 1–5, 11–16, 18–21; DAVOLI 1972, pl. 7, figs 1–2, 6, 9–11).

Distribution – Corsica, Cyprus, Switzerland (M), Italy (M-P), Spain (M-LP), Georgia (LM), Austria, France (LM-MM), Bosnia, Czech Republic, Moldavia, Poland, Romania, Sardinia, Serbia, Slovakia, Ukraine (MM), Greece (MM-LP), Turkey (MM-UM), Portugal (UM), Albania, Syria (P). Hungary: Várpalota (LM), Bánd, Diósd, (?)Kismaros, Letkés, Szob, Budapest: Illés street, Kerepesi street (MM).

Varioconus taurinensis (Bellardi et Michelotti, 1840)

(Figs 143–148)

1840 *Conus Striatulus* Brocchi var. *Taurinensis* – BELLARDI & MICHELOTTI, p. 62, pl. 7, figs 12–13.

1893 *Conus (Chelyconus) taurinensis* (Bellardi et Michelotti) – SACCO, p. 98, pl. 9, fig. 47, varieties: *fusolivooides*, *anomalomamilla*: p. 99, pl. 9, figs 50, 52.

1943 *Conus (Chelyconus) elegans* n. sp. – BANDAT, p. 342, pl. 2, figs 27–28.

1972 *Conus anomalomamillus* Sacco – DAVOLI, p. 74, pl. 4, figs 1–4, 6–13.

1972 *Conus taurinensis* (Bellardi et Michelotti) – DAVOLI, p. 134, pl. 8, fig. 12.

1997 *Conus (Chelyconus) cf. taurinensis* (Bellardi et Michelotti) – CHIRLI, p. 11, pl. 3, fig. 8.

1999 *Conus (Chelyconus) cfr. anomalomamillus* (Sacco) – MUÑIZ, p. 37, figs 2/A, 6/A–D (*cum syn.*).

1999 *Conus (Chelyconus) taurinensis* (Bellardi et Michelotti) – MUÑIZ, p. 64, figs 2/T, 8/G–H (*cum syn.*).

Material – 29 specimens.

Description – Shell small to medium-sized (SL: 16–30). Spire high, outline straight. The ultimate spiral whorl is higher than the preceding whorls, convex to step-like. Shoulder sloping. Body whorl conical, outline convex, smooth with fine ridges at the base. Subsutural flexure almost diagonal.

Remarks – The Letkés material agrees with the syntype (SACCO 1893, pl. 9, fig. 47, refigured by FERRERO MORTARA *et al.* 1984, pl. 20, fig. 3), and with the specimens illustrated in the literature. Two specimens figured here (Figs 143, 148) are close to the syntype of *C. taurinensis* var. *anomalomamilla* Sacco (1893, pl. 9, fig. 52, refigured by FERRERO MORTARA *et al.* 1984, pl. 20, fig. 2).

Distribution – Italy (M-P), Albania (MM), Spain (LP). Hungary: Letkés (MM).

Family Conilithidae Tucker et Tenorio, 2009
Subfamily Conilithinae Tucker et Tenorio, 2009
Genus *Conilithes* Swainson, 1840

Conilithes antidiluvianus (Bruguière, 1792)
(Fig. 149)

- 1792 *Conus antidiluvianus* – BRUGUIÈRE, p. 637, pl. 347, fig. 6.
1966 *Conus (Conolithus) antediluvianus* Bruguière – STRAUZ, p. 451, pl. 66, fig. 10, pl. 67, fig. 1
(*cum syn.*).
1971–1972 *Conus (Lithoconus) antediluvianus* Bruguière – CSEPREGHY-MEZNERICS, pl. 17, fig. 14.
1971–1972 *Conus (Lithoconus) antediluvianus anomalus* n. spp. – CSEPREGHY-MEZNERICS, pl. 17,
figs 9–10.
1999 *Conus (Conolithes) antidiluvianus* Bruguière – MUÑIZ, p. 69, figs 3/C, 5/E, 8/O–Q (*cum syn.*).
2009 *Conilithes antidiluvianus* (Bruguière) – TUCKER & TENORIO, pl. 9, fig. 8.
2011 *Conolithus antidiluvianus* (Bruguière) – HARZHAUSER *et al.*, p. 217, fig. 4.5.

Material – 14 specimens.

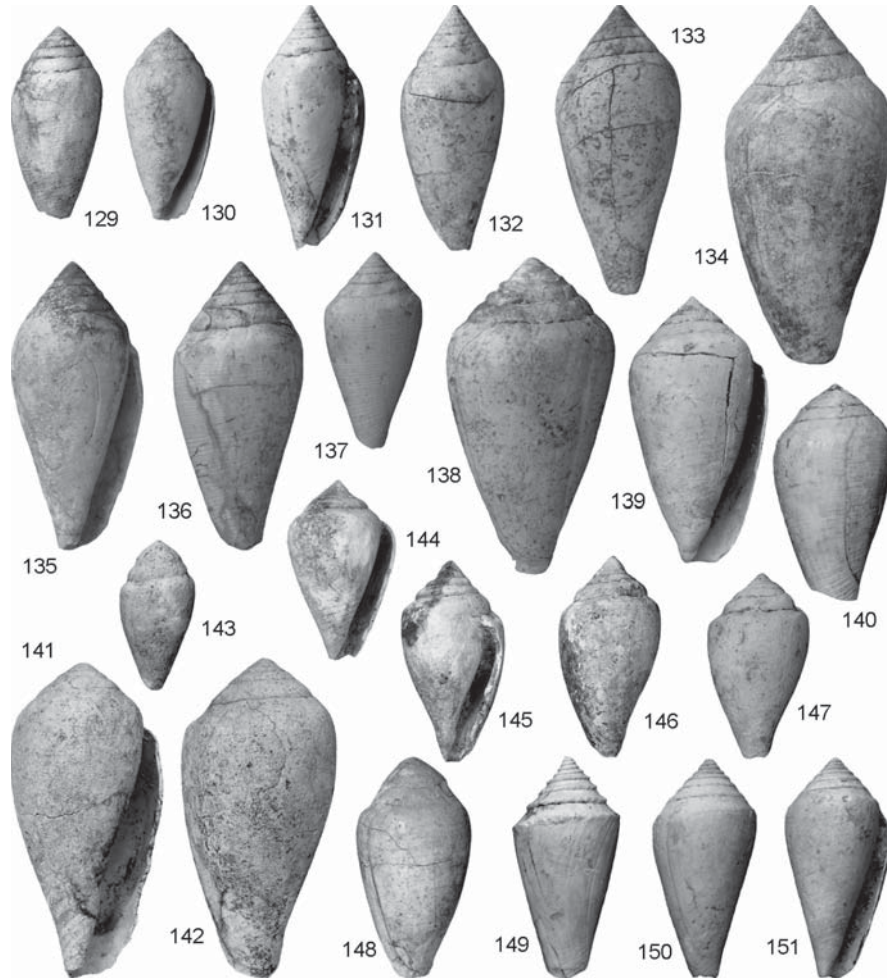
Description – Shell medium-sized (SL: 10–30). Spire high, outline straight, step-like. Sutural ramps concave, smooth. Shoulder carinate, finely tuberculate. Body whorl conical, outline straight, smooth with fine spiral grooves at the anterior end. Subsutural flexure asymmetrically curved.

Remarks – The Letkés material is close to the specimen figured by PEYROT (1930, pl. 1, figs 21–22) that was proposed by HALL (1964) as neotype. The specimens from Hidas (STRAUSZ 1966) slightly differ in more projected shoulders. *C. dujardini* is similar in morphology, but the tuberculation appears only on the apical whorls, and the outline of the body whorl is concave to sigmoid.

Distribution – Algeria, Bosnia, Corsica, Serbia, Switzerland (M), France, Spain (M-P), Austria, Czech Republic, Slovakia (LM-MM), Albania, Bulgaria, Cyprus, Greece, Portugal, Romania (MM), Belgium, Denmark, Germany, the Netherlands, (MM-UM), Turkey (M-LP), Italy, Morocco (MM-P). Hungary: Balaton, Borsodbóta, Csermely, Csokvaomány, Hidas, Letkés (MM).

Conilithes brocchii (Bronn, 1828)
(Figs 150–151)

- 1814 *Conus deperditus* Bruguière – BROCCHI, p. 292, pl. 3, fig. 2.
1828 *Conus Brocchii* – BRONN, p. 740.
1964 *Conus brocchii* Bronn – HALL, p. 140, pl. 23, figs 5–6, 10, 12 (*cum syn.*).
1971–1972 *Conus (Leptoconus) brocchii* (Bronn) – CSEPREGHY-MEZNERICS, pl. 17, fig. 11.
1985 *Leptoconus allionii* (Michelotti) – FÖZY & LEÉL-ÖSSY, pl. 3, fig. 5.
1996 *Conus brocchii* Bronn – SILVA, p. 40, fig. 4/5–6.
2012 *Conus brocchii* Bronn – LOZANO, p. 134, pl. 10, fig. 4 (*cum syn.*).



Figs 129–130. *Varioconus olivaeformis* (Hoernes et Auinger). INV 2013.229., SL: 26, MD: 12, abapertural and apertural views (1×). – **Figs 131–137.** *Varioconus pelagicus* (Brocchi). 131–132 = INV 2013.278., SL: 28, MD: 12, apertural and abapertural views (1.2×), 133 = INV 2013.280., SL: 39, MD: 17 (1×), 134 = INV 2013.283., SL: 48, MD: 23 (1×), 135–136 = INV 2013.286., SL: 40, MD: 18, apertural and abapertural views (1×), 137 = INV 2013.285., SL: 27, MD: 14 (1×). – **Figs 138–142.** *Varioconus ponderosus* (Brocchi). 138 = INV 2013.257., SL: 43, MD: 23 (1×), 139 = INV 2013.194., SL: 31, MD: 16.5 (1.2×), 140 = INV 2013.198., SL: 28, MD: 16 (1×), 141–142 = INV 2013.212., SL: 43.5, MD: 21, apertural and abapertural views (1×). – **Figs 143–148.** *Varioconus taurinensis* (Bellardi et Michelotti). 143 = morphotype *anomalomamillus* (Sacco), INV 2013.203., SL: 21, MD: 10.5 (1×), 144 = INV 2013.259., SL: 24, MD: 14 (1×), 145–146 = INV 2013.185., SL: 28, MD: 15, apertural and abapertural views (1×), 147 = INV 2013.272., SL: 25, MD: 14 (1×), 148 = morphotype *anomalomamillus* (Sacco), INV 2013.282., SL: 30, MD: 16 (1×). – **Fig. 149.** *Conilithes antidiluvianus* (Bruguière). INV 2013.271., SL: 30, MD: 15 (1×). – **Figs 150–151.** *Conilithes brocchii* (Bronn). INV 2013.281., SL: 20, MD: 10, abapertural and apertural views (1.5×)

Material – 42 specimens.

Description – Shell moderately small (SL: 10–20). Spire of low to moderate height, conical, outline concave. Whorls finely striate with raised edge. Weakly beaded apical whorls on some specimens. Shoulder angulate. Body whorl elongate conical, outline straight. Subsutural flexure asymmetrically curved, of moderate depth.

Remarks – The Letkés specimens agree in morphology with the holotype (figured by PINNA & SPEZIA 1978, pl. 18, fig. 3). *Conolithes striatulus* (Brocchi) is a similar form; however, it differs in flat and smooth spiral whorls, and in stratigraphic range. The spire of *C. dujardini* is higher with concave outline and smooth whorls.

Distribution – Italy (M-P), Germany, Morocco, Switzerland, Turkey (M), Austria, Romania (MM), Greece (MM-P), Spain (UM-LP), Algeria, France, Portugal (LP), Canary Islands (P). Hungary: Parád-fürdő (LM), Borsodbóta, Buják, Letkés (MM).

Conolithes canaliculatus (Brocchi, 1814)
(Figs 152–156)

1814 *Conus canaliculatus* – BROCCHI, p. 636, pl. 15, fig. 28 [non *Cucullus canaliculatus* Röding, 1798 *nomen nudum*].

1847 *Conus Bronnii* – MICHELOTTI, p. 339, pl. 14, fig. 3.

1879 *Conus (Leptoconus) Brezinae* nov. form. – HOERNES & AUINGER, p. 36.

1966 *Conus (Conolithus) dujardini brezinae* Hoernes et Auinger – STRAUSZ, p. 452, pl. 22, fig. 16, pl. 43, figs 3–5, pl. 67, figs 8–10 (*cum syn.*).

1973 *Conus (Conospira) dujardini* Deshayes – BOHN-HAVAS, p. 1066, pl. 8, figs 1–2.

1974 *Conus (Conolithus) canaliculatus* Brocchi – MALATESTA, p. 386, pl. 30, fig. 14 (*cum syn.*).

1997 *Conus (Conolithus) canaliculatus* Brocchi – CHIRLI, p. 12, pl. 3, figs 9–10 (*cum syn.*).

1999 *Conus (Chelyconus) canaliculatus* Brocchi – MUÑIZ, p. 40, figs 2/C, 6/I–J (*cum syn.*).

Material – 443 specimens.

Description – Shell biconical, moderately small (SL: 6–29). Spire elevated, outline straight. Spiral whorls high, angular, dropped. Sutural ramps steep, slightly concave. Shoulder angulate, sloping. Body whorl smooth with incised grooves at the anterior end. Aperture straight, narrow. Subsutural flexure symmetrically curved.

Remarks – The validity of the species was queried by BAŁUK (1997) and DAVOLI (2003), but was verified by CHIRLI (1997), MUÑIZ (1999) and FILMER (2011). In this paper both the morphological analysis and the comparisons by HALL (1964) are accepted; moreover, one more taxon is included. Like the size, the morphology and the stratigraphical range of *Conus brezinae* Hoernes et Auinger (= *C. dujardini* var. 4 in HÖRNES 1856: 40, pl. 5, fig. 8a–o) agree well

with the neotype of *Conilithes canaliculatus* (designated by HALL 1964: 142, pl. 24, figs 6–7, refigured by PINNA & SPEZIA 1978, pl. 19, fig. 2), *C. brezinae* is regarded here as a junior synonym of *C. canaliculatus*. The Letkés specimens match the neotype in overall morphology. The material provides an opportunity to analyse the variety of the species. The RSH of 100 studied specimens ranges between 29.4–42.8%, the average rate is 35.4%. The taxon is closely allied to *C. dujardini* in morphology, but it clearly differs in higher spire, and in less raised, inclined spiral whorls. The *Conus elongatus* Borson specimen figured by CAPROTTI (2011, fig. 7/P–Q) seems to be *Conilithes canaliculatus* rather than *C. dujardini* proposed by BRUNETTI *et al.* (2012).

Distribution – Germany, Switzerland, Turkey (M), Italy (M-P), Austria, Bosnia, Bulgaria, Czech Republic, Greece, Slovakia, Poland, Portugal, Romania, Serbia, Slovenia, Ukraine (MM), France (MM-UM), Spain (MM-LP), Morocco (UM). Hungary: Várpalota (LM), Balaton, Borsodbóta, Diósd, Hidas, Hont, Letkés, Mátraverebély, Péccszabolcs, Szob, Budapest: Illés street (MM).

Conilithes dujardini (Deshayes, 1845)
(Figs 157–159)

1830 *Conus exaltatus* – EICHWALD, p. 222.

1839–1853 *Conus Dujardini* Deshayes – DESHAYES, pl. 120, fig. 8.

1845 *Conus Dujardini* – DESHAYES, p. 158.

1853 *Conus exaltatus* – EICHWALD, p. 208, pl. 9, fig. 3.

1936 *Conus (Leptoconus) Dujardini* Deshayes var. *egerensis* – NOSZKY, p. 81.

1954 *Conus (Conolithus) dujardini* Deshayes – STRAUSZ, p. 78, pl. 7, fig. 144.

1966 *Conus (Conolithus) dujardini* Deshayes – STRAUSZ, p. 451, pl. 67, figs 2–5, 7.

non 1973 *Conus (Conospira) dujardini* Deshayes – BOHN-HAVAS, pl. 8, figs 1–2 (= *C. canaliculatus* Brocchi, 1814).

1973 *Conus (Conospira) dujardini brezinae* Hoernes et Auinger – BOHN-HAVAS, p. 1067, pl. 8, fig. 6.

2010 *Conus (Conolithus) dujardini* Deshayes – CAZE *et al.*, p. 35, Fig. 5/N.

Material – 79 specimens.

Description – Shell moderately small (SL: 11–26). Spire high, outline straight to concave. Apical whorls tuberculate. Teleoconch sutural ramps concave, whorls smooth to finely striate. Shoulder angulate in early whorls, carinate in the last whorl. Body whorl conical, outline concave, either smooth with spiral grooves from the base up to the mid-height or fully ornamented with fine grooves. Subsutural flexure asymmetrically curved and deep.

Remarks – Remarkably different forms have been documented in the literature under the name *C. dujardini*. In the Letkés material, RSH of 30 specimens was between 22.7–31.8% with an average of 27.78%. The species is characterised by three phenotypically different forms. Most specimens in the literature agree

with the type in smooth upper part of the body whorl (e.g. STRAUSZ 1966, pl. 67, fig. 4; CHIRA & VOIA 2001, pl. 1, fig. 5), while others, with identical morphology, are fully ornamented with incised spiral grooves (STRAUSZ 1966, pl. 67, figs 2–3; BAŁUK 1997, pl. 19, figs 5–8). Granulated shells also occurred in the Miocene fossil records (COOMANS 1973). Similarly to shell granulation, striate ornamentation can also be interpreted within a single species; therefore the validity of *C. exaltatus* is rejected here. It must be emphasised that on the principle of priority, EICHWALD (1830) ought to be entitled to the authorship of the species in question. Based on the widespread use of *dujardini*, however, conservation of DESHAYES' taxon name is acknowledged here. Some considerations of phylogenetic relationships between Mediterranean Tertiary conoids including *C. dujardini* were offered by FERRERO & PICCOLI (1970). *C. antidualuvianus* and *C. canaliculatus* with similar morphology and Lower Miocene appearance are probably descendants of the species.

Distribution – Denmark, Germany, the Netherlands (UE-M), Azores Islands, Belgium, Corsica, Portugal, Sardinia (M), France, Italy, Turkey (M-P), Austria, Czech Republic, Greece, Slovakia (LM-MM), Bosnia, Bulgaria, Croatia, Moldavia, Sardinia, Serbia, Ukraine (MM), Greece (MM-UM), Libya (MM-P), Algeria, Crete, Spain (UM), England (UP). Hungary: Balassagyarmat, Diósjenő, Eger, Novaj (UO), Hont, Mogyoród, Nagybátony, Tar, Várpalota (LM), Bánd, Borsodbóta, Diósd, Herend, Hetvehely, Hidas, Kovácsvágás, Letkés, Márkháza, Mátraverebély, Nógrádszakál, Sámsonháza, Szob, Szokolya, Várpalota, Zebegény, Budapest: Rákos, Illés street (MM).

Conilithes granularis (Borson, 1820)
(Fig. 160)

1820 *Conus Granularis* – BORSON, p. 196, pl. 1, fig. 3.

1956 *Conus (Stephanoconus) stachei* Hoernes et Auinger – CSEPREGHY-MEZNERICS, p. 421, pl. 3, fig. 7.

1964 *Conus granularis* Borson – HALL, p. 148, pl. 22, figs 6, 11–12 (*cum syn.*).

1966 *Conus (Hemiconus) granularis stachei* Hoernes et Auinger – STRAUSZ, p. 450, pl. 66, fig. 9 (*cum syn.*).

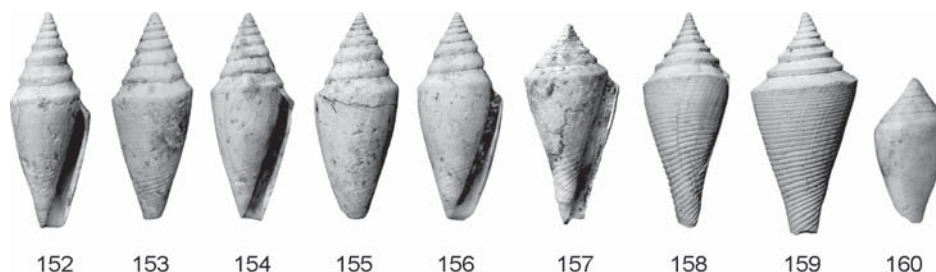
1971–1972 *Conus (Hemiconus) granularis stachei* Hoernes et Auinger – CSEPREGHY-MEZNERICS, pl. 17, figs 23–24.

1997 *Hemiconus granularis* (Borson) – BAŁUK, p. 54, pl. 20, figs 1–4 (*cum syn.*).

2001 *Hemiconus granularis* (Borson) – LOZOUET *et al.*, p. 69, pl. 31, fig. 7 (*cum syn.*).

Material – 23 specimens.

Description – Shell biconical, small (SL: 5–11). Spire high, outline straight. Teleoconch sutural ramps slightly concave, ornamented with two fine grooves in the middle. Shoulder angular, finely tuberculate on some specimens. Body whorl conical, outline straight to sigmoid, smooth with spiral ridges at the base or en-



Figs 152–156. *Conilithes canaliculatus* (Brocchi). 152 = INV 2013.207., SL: 23, MD: 8 (1.2×), 153–154 = INV 2013.208., SL: 26, MD: 10, abapertural and apertural views (1×), 155–156 = INV 2013.209., SL: 22, MD: 9, abapertural and apertural views (1.2×). – **Figs 157–159.** *Conilithes dujardini* (Deshayes). 157 = INV 2013.215., SL: 21, MD: 10 (1.2×), 158 = INV 2013.217., SL: 23, MD: 10 (1.2×), 159 = INV 2013.216., SL: 19, MD: 8 (1.5×). – **Fig 160.** *Conilithes granularis* (Borson). INV 2013.279., SL: 9, MD: 4 (2×)

tirely covered with regularly spaced, fine spiral ridges. Subsutural flexure symmetrically curved, of moderate depth.

Remarks – The Letkés material agrees with the holotype (figured by PAVIA 1976, pl. 2, fig. 12), and with the specimens represented from other Hungarian localities. The species occurs in two phenotypically different forms. The typical form is ornamented by spiral rows of granulations on the body whorl (see the holotype, and BAŁUK 1997, pl. 20, figs 2–4), while the characteristic Central Paratethyan form has mainly smooth, and finely striate shell (STRAUSZ 1966; BAŁUK l. c., pl. 20, fig. 1).

Distribution – France (M), Italy (M-P), Austria, Bosnia, Bulgaria, Czech Republic, Poland, Romania, Slovakia, Ukraine (MM). Hungary: Bánd, Borsod-bóta, Letkés, Szob (MM).

CONCLUSION

The Conoidean material of the Letkés assemblage described in this paper is the largest one in both size and diversity that has ever been recorded from Badenian deposits of Hungary. 3786 identified specimens represent 39 species, some of which had been so far unknown from Hungary. Contrary to this flourish, only 6 conoid species are known from the preceding Karpatian localities of the country. The Badenian “bloom” of most marine gastropod families was the upshot of the early Middle Miocene climatic optimum with related rise in relative sea-level (HARZHAUSER & PILLER 2007), and as a result, clear Mediterranean character became dominant in the Central Paratethys. The Letkés conoid record provides new data for the palaeogeographic interpretation of the Langhian Stage.

Beside the intensification of knowledge on Conoidean diversity, the occurrence of *Leptoconus hirmetzli* sp. n. has further potential in palaeobiogeographic implication, too. As the ranges of species with similar morphology have been characteristic from the Pliocene in the Indo-Pacific region, a Central Paratethyan fossil species that resembles *L. milneedwardsi milneedwardsi* can provide a new proof for the discussed connection of the two regions in the early Badenian (see RÖGL 1998, and GONCHAROVA *et al.* 2004).

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Acknowledgements – We would like to thank the following colleagues for their professional help: Piroska Kassai helped us with the map of the locality; Bruno Dell’Angelo (Genova), Alan J. Kohn (Washington), Helmut Krock (Lüneburg), Anita Eschner and Sándor Békési (Wien) kindly sent us rare malacological publications; Orsolya Székelyhidi and István Szente (Budapest) contributed to the illustration work; Zoltán Evanics (Mindszent) helped with comments on stratigraphical interpretations. Constructive reviews by Alfréd Dulai (Budapest) and by Helmut Krock helped to improve the manuscript. We are also grateful to the staff of the Geological Library of the Geological and Geophysical Institute of Hungary.

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